Analyzing various equations concerning some topics of Field Theory, String Theory and Gravity. Mathematical connections and applications of κ formula regarding the Zeros of Riemann Zeta Function and Ramanujan Mathematics. III

Michele Nardelli[1], **Antonio Nardelli**[2]

Abstract

In this research thesis (part III), we analyze various equations concerning some topics of Field Theory, String Theory and Gravity. We describe the new possible mathematical connections and applications of κ formula regarding the Zeros of Riemann Zeta Function and Ramanujan Mathematics.

---

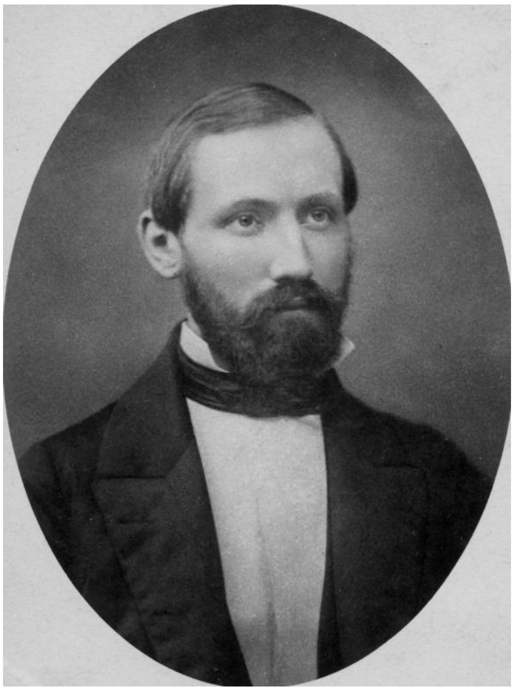
[1] M.Nardelli studied at Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

[2] A. Nardelli studies at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**

Bernhard Riemann

(1826-1866)

(Mathematician)



Vesuvius landscape with gorse – Naples

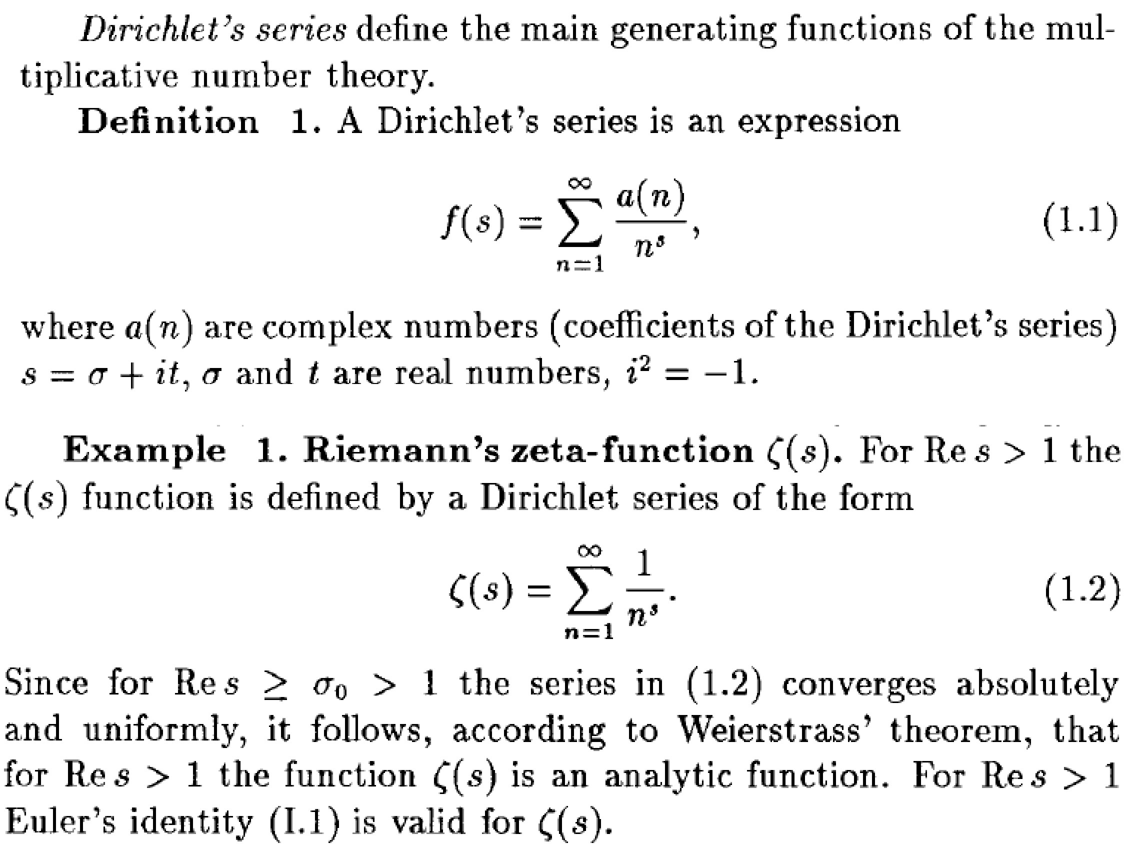
https://www.pinterest.it/pin/95068242114589901/

We want to highlight that the development of the various equations was carried out according an our possible logical and original interpretation

From:

Complex Analysis in Number Theory – 22.11.1994 - *Anatoly A. Karatsuba*

We have that:



Dirichlet's series define the main generating functions of the multiplicative number theory.

Definition 1. A Dirichlet's series is an expression

$$f(s) = \sum_{n=1}^{\infty} \frac{a(n)}{n^s}, \tag{1.1}$$

where $a(n)$ are complex numbers (coefficients of the Dirichlet's series) $s = \sigma + it$, σ and t are real numbers, $i^2 = -1$.

Example 1. Riemann's zeta-function $\zeta(s)$. For $\operatorname{Re} s > 1$ the $\zeta(s)$ function is defined by a Dirichlet series of the form

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}. \tag{1.2}$$

Since for $\operatorname{Re} s \geq \sigma_0 > 1$ the series in (1.2) converges absolutely and uniformly, it follows, according to Weierstrass' theorem, that for $\operatorname{Re} s > 1$ the function $\zeta(s)$ is an analytic function. For $\operatorname{Re} s > 1$ Euler's identity (I.1) is valid for $\zeta(s)$.

Example 12. For $\operatorname{Re} s > 1$ the Davenport-Heilbronn function $f(s)$ (see [42, 209, 95]) is defined by the Dirichlet series

$$f(s) = \sum_{n=1}^{\infty} \frac{r(n)}{n^s},$$

where $r(1) = 1$, $r(2) = \varkappa$, $r(3) = -\varkappa$, $r(4) = -1$, $r(5) = 0$, $r(n+5) = r(n)$, $\varkappa = \frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$.

Theorem. *Suppose that* $G(s)$ *is an entire function of finite order,* $P(s)$ *is a polynomial,* $f(s) = G(s)P^{-1}(s)$, *and the series* $f(s) = \sum_{n=1}^{\infty} a(n)n^{-s}$ *is absolutely convergent for* $\operatorname{Re} s > 1$. *Further suppose that*

$$\pi^{-s/2}\Gamma\left(\frac{s}{2}\right) f(s) = \pi^{-(1-s)/2}\Gamma\left(\frac{1-s}{2}\right) g(1-s), \tag{3}$$

where the series $g(1-s) = \sum_{n=1}^{\infty} b(n)n^{-1+s}$ *is absolutely convergent for* $\operatorname{Re} s < -\alpha < 0$. *Then*

$$f(s) = C\zeta(s),$$

where C *is a constant.*

Note that (3) is even weaker than (2). The question naturally arises: does a functional equation of the type (2) determine the location of the zeros of the corresponding function? It turns out that this is not the case. A simple counterexample is given by the following function $f(s)$, which was introduced by Davenport and Heilbronn [3] in 1936:

$$f(s) = \frac{1-i\kappa}{2} L(s, \chi_1) + \frac{1+i\kappa}{2} L(s, \overline{\chi}_1), \tag{4}$$

where $\kappa = (\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1)$ and $\chi_1 = \chi_1(n)$ is the Dirichlet character modulo 5 with

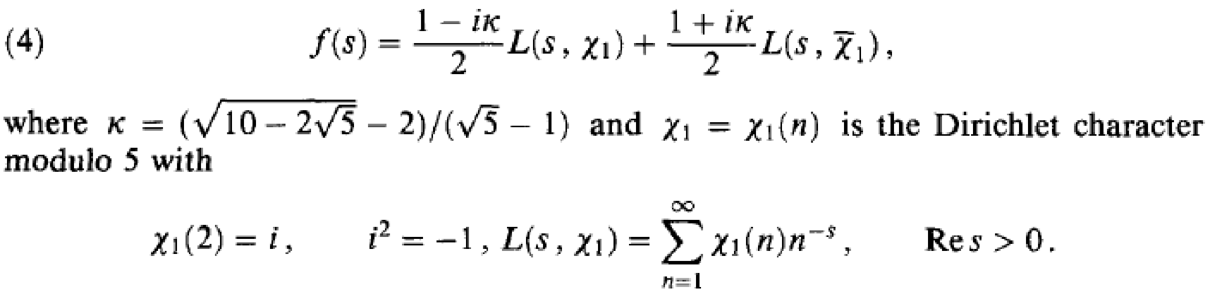
$$\chi_1(2) = i, \qquad i^2 = -1, \ L(s, \chi_1) = \sum_{n=1}^{\infty} \chi_1(n)n^{-s}, \qquad \operatorname{Re} s > 0.$$

For $\operatorname{Re} s > 0$ the function $f(s)$ has the following representation as a Dirichlet series:

$$f(s) = \sum_{n=1}^{\infty} r(n)n^{-s}, \tag{5}$$

where $r(n) = r(m)$ if $n \equiv m \pmod 5$, and $r(1) = 1$, $r(2) = \kappa$, $r(3) = -\kappa$, $r(4) = -1$, $r(5) = 0$. In addition, $f(s)$ satisfies the functional equation

$$g(s) = g(1-s), \qquad g(s) = \left(\frac{\pi}{5}\right)^{-s/2} \Gamma\left(\frac{s+1}{2}\right) f(s). \tag{6}$$



(4) $$f(s)=\frac{1-i\kappa}{2}L(s,\chi_1)+\frac{1+i\kappa}{2}L(s,\overline{\chi}_1),$$

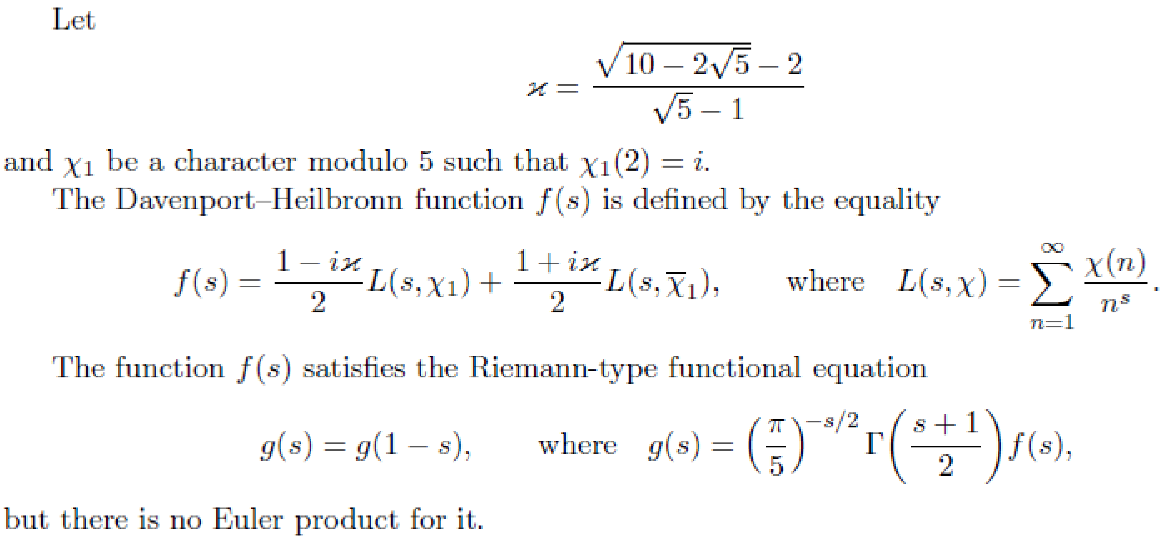
where $\kappa=(\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1)$ and $\chi_1=\chi_1(n)$ is the Dirichlet character modulo 5 with

$$\chi_1(2)=i,\qquad i^2=-1,\ L(s,\chi_1)=\sum_{n=1}^{\infty}\chi_1(n)n^{-s},\qquad \mathrm{Re}\,s>0.$$

From:

On the Zeros of the Davenport Heilbronn Function
S. A. Gritsenko - Received May 15, 2016 - ISSN 0081-5438, Proceedings of the Steklov Institute of Mathematics, 2017, Vol. 296, pp. 65–87.

We have:



Let

$$\varkappa=\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$$

and χ_1 be a character modulo 5 such that $\chi_1(2)=i$.

The Davenport–Heilbronn function $f(s)$ is defined by the equality

$$f(s)=\frac{1-i\varkappa}{2}L(s,\chi_1)+\frac{1+i\varkappa}{2}L(s,\overline{\chi}_1),\qquad \text{where}\quad L(s,\chi)=\sum_{n=1}^{\infty}\frac{\chi(n)}{n^s}.$$

The function $f(s)$ satisfies the Riemann-type functional equation

$$g(s)=g(1-s),\qquad \text{where}\quad g(s)=\left(\frac{\pi}{5}\right)^{-s/2}\Gamma\left(\frac{s+1}{2}\right)f(s),$$

but there is no Euler product for it.

$$(\sqrt{10-2\sqrt{5}}-2)/(\sqrt{5}-1)=\kappa$$

Input:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}$$

Decimal approximation:

0.28407904384041229602829183239312616909108808844573758275916626661

...

0.28407904384…. = κ

Alternate forms:

$$\frac{1}{4}\left(\sqrt{10-2\sqrt{5}}-2\sqrt{5}+\sqrt{5\left(10-2\sqrt{5}\right)}-2\right)$$

$$\frac{1}{4}\left(1+\sqrt{5}\right)\left(\sqrt{10-2\sqrt{5}}-2\right)$$

$$\frac{1}{2}\left(-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}\right)$$

Minimal polynomial:

$$x^4+2x^3-6x^2-2x+1$$

Expanded forms:

$$\frac{\sqrt{10-2\sqrt{5}}}{\sqrt{5}-1}-\frac{2}{\sqrt{5}-1}$$

$$\frac{1}{4}\sqrt{10-2\sqrt{5}}+\frac{1}{4}\sqrt{5\left(10-2\sqrt{5}\right)}+\frac{1}{2}\left(-1-\sqrt{5}\right)$$

For (((($\sqrt{}$(10-2$\sqrt{}$5) -2))/((√5-1)))) = 8πG; G = 0.011303146014

Indeed:

(((($\sqrt{}$(10-2$\sqrt{}$5) -2))/((√5-1))))/(8π)

Input:

$$\frac{\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}}{8\pi}$$

Result:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{8\left(\sqrt{5}-1\right)\pi}$$

Decimal approximation:

0.0113031460140052147973750129442035744685760313920017808594909667 …

0.01130314…. = g (gravitational coupling constant)

Property:

$\frac{-2+\sqrt{10-2\sqrt{5}}}{8\left(-1+\sqrt{5}\right)\pi}$ is a transcendental number

Alternate forms:

$$\frac{\sqrt{10-2\sqrt{5}}-2\sqrt{5}+\sqrt{5\left(10-2\sqrt{5}\right)}-2}{32\pi}$$

$$-\frac{1+\sqrt{5}-\sqrt{2\left(5+\sqrt{5}\right)}}{16\pi}$$

$$\frac{-1-\sqrt{5}+\sqrt{2\left(5+\sqrt{5}\right)}}{16\pi}$$

Expanded forms:

$$-\frac{1}{16\pi}-\frac{\sqrt{5}}{16\pi}+\frac{\sqrt{10-2\sqrt{5}}}{32\pi}+\frac{\sqrt{5\left(10-2\sqrt{5}\right)}}{32\pi}$$

$$\frac{\sqrt{10-2\sqrt{5}}}{8\left(\sqrt{5}-1\right)\pi}-\frac{1}{4\left(\sqrt{5}-1\right)\pi}$$

Series representations:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)}=\frac{-2+\sqrt{9-2\sqrt{5}}\sum_{k=0}^{\infty}\binom{\frac{1}{2}}{k}\left(9-2\sqrt{5}\right)^{-k}}{8\pi\left(-1+\sqrt{4}\sum_{k=0}^{\infty}4^{-k}\binom{\frac{1}{2}}{k}\right)}$$

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)} = \frac{-2+\sqrt{9-2\sqrt{5}}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(9-2\sqrt{5}\right)^{-k}}{k!}}{8\pi\left(-1+\sqrt{4}\ \sum_{k=0}^{\infty}\frac{\left(-\frac{1}{4}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)}$$

$$\frac{\sqrt{10-2\sqrt{5}}-2}{(8\pi)\left(\sqrt{5}-1\right)} = \frac{-2+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(10-2\sqrt{5}-z_0\right)^k z_0^{-k}}{k!}}{8\pi\left(-1+\sqrt{z_0}\ \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(5-z_0\right)^k z_0^{-k}}{k!}\right)}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

We note that:

(((√(10-2√5) -2))/((√5-1)))*((2 i (sqrt(5) - 1) t + sqrt(5) - 1)/(2 (sqrt(2 (5 - sqrt(5))) - 2)))

Input:

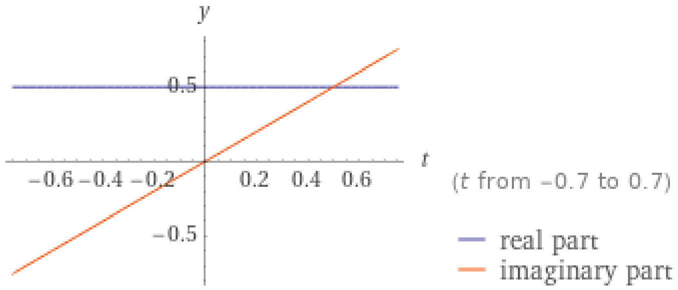
$$\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1} \times \frac{2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)}$$

i is the imaginary unit

Exact result:

$$\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{2\left(\sqrt{5}-1\right)\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)}$$

Plot:



(t from −0.7 to 0.7)

Alternate form assuming t>0:

$$\frac{i\sqrt{10-2\sqrt{5}}\,t}{\sqrt{2(5-\sqrt{5})}-2}-\frac{2\,i\,t}{\sqrt{2(5-\sqrt{5})}-2}+\frac{\sqrt{5(10-2\sqrt{5})}}{2(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)}-\frac{\sqrt{10-2\sqrt{5}}}{2(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)}-\frac{\sqrt{5}}{(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)}+\frac{1}{(\sqrt{5}-1)\left(\sqrt{2(5-\sqrt{5})}-2\right)}$$

Alternate forms:

$$\frac{1}{8}(1+\sqrt{5})\left(2\,i\sqrt{2(3-\sqrt{5})}\,t+\sqrt{5}-1\right)$$

$$\frac{1}{2}(1+2\,i\,t)$$

$$\frac{1}{2} + i\,t$$

1/2+it = real part of every nontrivial zero of the Riemann zeta function

Derivative:

$$\frac{d}{dt}\left(\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{\left(\sqrt{5}-1\right)\left(2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)\right)}\right) = i$$

Indefinite integral:

$$\int \frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{\left(\sqrt{5}-1\right)\left(2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)\right)}\,dt = \frac{t}{2} + \frac{i\,t^2}{2} + \text{constant}$$

And again:

(((√(10-2√5) -2))/((2x)))*((2 i (sqrt(5) - 1) t + sqrt(5) - 1)/(2 (sqrt(2 (5 - sqrt(5))) - 2))) = (1/2+it)

Input:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{2\,x} \times \frac{2\,i\left(\sqrt{5}-1\right)t+\sqrt{5}-1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)} = \frac{1}{2} + i\,t$$

i is the imaginary unit

Exact result:

$$\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)\left(2i\left(\sqrt{5}-1\right)t+\sqrt{5}-1\right)}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}=\frac{1}{2}+it$$

Alternate form assuming t and x are real:

$$\frac{\sqrt{5}-1}{x}=2$$

Alternate form:

$$\frac{\left(\sqrt{5}-1\right)(1+2it)}{4x}=\frac{1}{2}+it$$

Alternate form assuming t and x are positive:

$$2x+1=\sqrt{5}$$

Expanded forms:

$$\frac{i\sqrt{5\left(10-2\sqrt{5}\right)}\,t}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}-\frac{i\sqrt{10-2\sqrt{5}}\,t}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}-\frac{i\sqrt{5}\,t}{\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}+\frac{it}{\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}+\frac{\sqrt{5\left(10-2\sqrt{5}\right)}}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}-\frac{\sqrt{10-2\sqrt{5}}}{4\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}-\frac{\sqrt{5}}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}+\frac{1}{2\left(\sqrt{2\left(5-\sqrt{5}\right)}-2\right)x}=\frac{1}{2}+it$$

$$\frac{i\sqrt{5}\,t}{2x}-\frac{it}{2x}+\frac{\sqrt{5}}{4x}-\frac{1}{4x}=\frac{1}{2}+it$$

Solutions:

$$t = \frac{i}{2}, \quad x \neq 0$$

$$x = \frac{\sqrt{5}}{2} - \frac{1}{2}$$

Input:

$$\frac{\sqrt{5}}{2} - \frac{1}{2}$$

Decimal approximation:

0.6180339887498948482045868343656381177203091798057628621354486227
…

$0.6180339887\ldots. = \frac{1}{\phi}$

Solution for the variable x:

$$x = \frac{-2\,i\sqrt{5}\,t + 2\,i\,t - \sqrt{5} + 1}{-2 - 4\,i\,t}$$

Implicit derivatives:

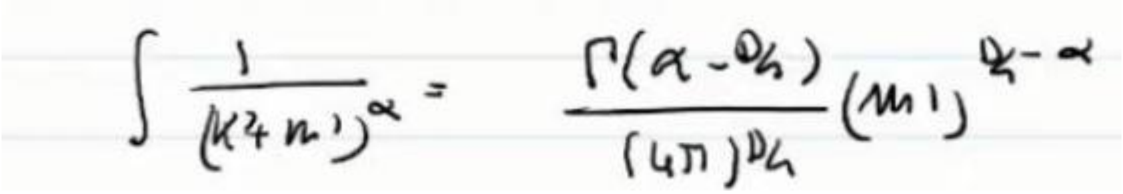
$$\frac{\partial x(t)}{\partial t} = \frac{2\left(-1 + \sqrt{5} - 2\,x\right)x}{\left(-1 + \sqrt{5}\right)(-i + 2\,t)}$$

$$\frac{\partial t(x)}{\partial x} = \frac{\left(-1 + \sqrt{5}\right)(-i + 2\,t)}{2\left(-1 + \sqrt{5} - 2\,x\right)x}$$

From:

Course of Field Theory and Gravity - *Prof. Augusto Sagnotti* (SNS Pisa-Italy)

We have that:



$$\int \frac{1}{(k^2+m^2)^\alpha} = \frac{\Gamma(\alpha - D/2)}{(4\pi)^{D/2}}(m^2)^{D/2-\alpha}$$

integrate [1/(k^2+0.511^2)^(1/137)] = ((Γ(1/137 – 10/2) / (4π)^(10/2)))*(0.511^2)^(10/2-1/137)

Input:

$$\int \frac{1}{\sqrt[137]{k^2+0.511^2}}\,dk = \frac{\Gamma\left(\frac{1}{137}-\frac{10}{2}\right)}{(4\,\pi)^{10/2}}\left(0.511^2\right)^{10/2-1/137}$$

$\Gamma(x)$ is the gamma function

Result:

$$1.00985\,k\,{}_2F_1\left(0.00729927, 0.5; 1.5; -3.82964\,k^2\right) = -4.52272\times 10^{-9}$$

${}_2F_1(a, b; c; x)$ is the hypergeometric function

Numerical solution:

$k \approx -4.47861174937212\times 10^{-9}\ldots$

$-4.47861174\ldots*10^{-9}$

integrate [1/(k^2+0.511^2)^(0.937)] = ((Γ(0.937 – 10/2) / (4π)^(10/2)))*(0.511^2)^(10/2-0.937)

Input:

$$\int \frac{1}{\left(k^2+0.511^2\right)^{0.937}}\,dk = \frac{\Gamma\left(0.937-\frac{10}{2}\right)}{(4\,\pi)^{10/2}}\left(0.511^2\right)^{10/2-0.937}$$

$\Gamma(x)$ is the gamma function

Result:

$$3.519\,k\,{}_2F_1\left(0.5,\,0.937;\,1.5;\,-3.82964\,k^2\right) = -8.25027\times 10^{-9}$$

${}_2F_1(a,\,b;\,c;\,x)$ is the hypergeometric function

Numerical solution:

$k \approx -2.34449286641592\times 10^{-9}\ldots$

$-2.34449286\ldots{}*10^{-9}$

integrate [1/(k^2+125.1^2)^(0.937)] = ((Γ(0.937 – 10/2) / (4π)^(10/2)))*(125.1^2)^(10/2-0.937)

Input:

$$\int \frac{1}{\left(k^2+125.1^2\right)^{0.937}}\,dk = \frac{\Gamma\left(0.937-\frac{10}{2}\right)}{(4\,\pi)^{10/2}}\left(125.1^2\right)^{10/2-0.937}$$

$\Gamma(x)$ is the gamma function

Result:

$$0.000117419\,k\,{}_2F_1\left(0.5,\,0.937;\,1.5;\,-0.0000638977\,k^2\right) = -2.12889\times 10^{11}$$

$-2.12889*10^{11}$

integrate [1/(k^2+80.379^2)^(0.937)] = ((Γ(0.937 – 10/2) / (4π)^(10/2)))*(80.379^2)^(10/2-0.937)

Input interpretation:

$$\int \frac{1}{\left(k^2+80.379^2\right)^{0.937}}\,dk = \frac{\Gamma\left(0.937-\frac{10}{2}\right)}{(4\,\pi)^{10/2}}\left(80.379^2\right)^{10/2-0.937}$$

$\Gamma(x)$ is the gamma function

Result:

$$0.000269006\,k\;{}_2F_1\left(0.5,\,0.937;\,1.5;\,-0.00015478\,k^2\right) = -5.84829\times10^9$$

$-5.84829*10^9$

(-2.12889e+11) *1/[(((integrate [1/(k^2+80.379^2)^(0.937)] = ((Γ(0.937 – 10/2) / (4π)^(10/2)))*(80.379^2)^(10/2-0.937))))]

Input interpretation:

$$-2.12889\times10^{11}\times\frac{1}{\int\frac{1}{\left(k^2+80.379^2\right)^{0.937}}\,dk = \frac{\Gamma\left(0.937-\frac{10}{2}\right)}{(4\pi)^{10/2}}\left(80.379^2\right)^{10/2-0.937}}$$

Γ(x) is the gamma function

Result:

$$-\frac{2.12889\times10^{11}}{0.000269006\,k\;{}_2F_1\left(0.5,\,0.937;\,1.5;\,-0.00015478\,k^2\right) = -5.84829\times10^9}$$

-(2.12889×10^11)/(-5.84829×10^9)

Input interpretation:

$$\frac{-2.12889\times10^{11}}{-5.84829\times10^9}$$

Result:

36.401922613276701394766675387164453199140261512339504367943450136...

36.4019226….

48*(-2.12889e+11) *1/[(((integrate [1/(k^2+80.379^2)^(0.937)] = ((Γ(0.937 – 10/2) / (4π)^(10/2)))*(80.379^2)^(10/2-0.937))))]-18

Input interpretation:

$$48\left(-2.12889\times 10^{11}\right)\times \frac{1}{\int \frac{1}{\left(k^2+80.379^2\right)^{0.937}}\,dk = \frac{\Gamma\left(0.937-\frac{10}{2}\right)}{(4\pi)^{10/2}}\left(80.379^2\right)^{10/2-0.937}} - 18$$

$\Gamma(x)$ is the gamma function

Result:

$$-\frac{1.02187\times 10^{13}}{0.000269006\,k\,{}_2F_1\left(0.5, 0.937; 1.5; -0.00015478\,k^2\right) = -5.84829\times 10^{9}} - 18$$

-(1.02187×10^13)/(-5.84829×10^9)-18

Input interpretation:

$$\frac{-1.02187\times 10^{13}}{-5.84829\times 10^{9}} - 18$$

Result:

1729.2970731615566259539113142474124915146136733985489775643820672…

1729.29707316….≈ 1729 This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

(((-(1.02187×10^13)/(-5.84829×10^9)-18)))^1/15

Input interpretation:

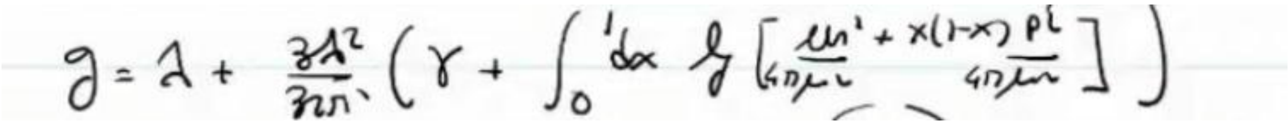
$$\sqrt[15]{\frac{-1.02187\times 10^{13}}{-5.84829\times 10^{9}} - 18}$$

Result:

1.64383…

1.64383….≈ $\zeta(2) = \frac{\pi^2}{6}$ = 1.644934 ...

From:



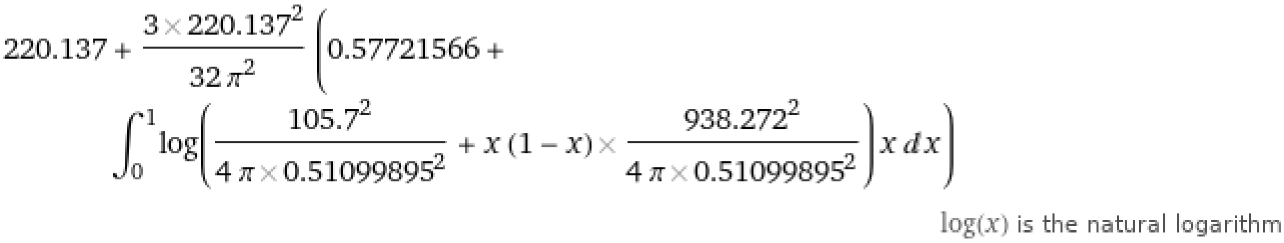
$$g = \lambda + \frac{3\lambda^2}{32\pi^2}\left(\gamma + \int_0^1 dx \lg\left[\frac{m^2}{4\pi\mu^2} + x(1-x)\frac{p^2}{4\pi\mu^2}\right]\right)$$

λ = -5.18182×10^-9 or 220.137

μ = 0.51099895

220.137+(((3(220.137)^2)/(32π^2)))(0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1])

Input interpretation:



$$220.137 + \frac{3\times 220.137^2}{32\pi^2}\left(0.57721566 + \int_0^1 \log\left(\frac{105.7^2}{4\pi\times 0.51099895^2} + x(1-x)\times\frac{938.272^2}{4\pi\times 0.51099895^2}\right)x\,dx\right)$$

log(x) is the natural logarithm

Result:

2933.54

2933.54

-5.18182×10^-9+(((3(-5.18182×10^-9)^2)/(32π^2)))(0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1])

Input interpretation:

$$-5.18182\times 10^{-9}+\frac{3\left(-5.18182\times 10^{-9}\right)^2}{32\pi^2}\left(0.57721566+\int_0^1\log\left(\frac{105.7^2}{4\pi\times 0.51099895^2}+x(1-x)\times\frac{938.272^2}{4\pi\times 0.51099895^2}\right)x\,dx\right)$$

log(x) is the natural logarithm

Result:

$$-5.18182\times 10^{-9}$$

$-5.18182*10^{-9}$

Computation result:

$$-5.18182\times 10^{-9}+\frac{1}{32\pi^2}\left(3\left(-5.18182\times 10^{-9}\right)^2\right)\left(0.57721566+\int_0^1\log\left(\frac{105.7^2}{4\pi\, 0.51099895^2}+\frac{x(1-x)\,938.272^2}{4\pi\, 0.51099895^2}\right)x\,dx\right)=-5.18182\times 10^{-9}$$

From which:

ln[-5.18182×10^-9+(((3(-5.18182×10^-9)^2)/(32π^2))) (0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1])]+1

Input interpretation:

$$\log\left(-5.18182\times 10^{-9}+\frac{3\left(-5.18182\times 10^{-9}\right)^2}{32\pi^2}\left(0.57721566+\int_0^1\log\left(\frac{105.7^2}{4\pi\times 0.51099895^2}+x(1-x)\times\frac{938.272^2}{4\pi\times 0.51099895^2}\right)x\,dx\right)\right)+1$$

log(x) is the natural logarithm

Result:

$-18.0781 + 3.14159\,i$

Input interpretation:

$-18.0781 + 3.14159\,i$

i is the imaginary unit

Result:

$-18.0781\ldots +$
$3.14159\ldots\,i$

Polar coordinates:

$r = 18.349$ (radius), $\theta = 2.96953$ (angle)

18.349

30/(-18.0781 + 3.14159 i)

Input interpretation:

$$\frac{30}{-18.0781 + 3.14159\,i}$$

i is the imaginary unit

Result:

$-1.61082\ldots -$
$0.279927\ldots\,i$

Polar coordinates:

$r = 1.63496$ (radius), $\theta = -2.96953$ (angle)

1.63496 result very near to the mean between $\zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$ and the value of golden ratio 1.61803398…, i.e. 1.63148399

Multiplying the two results, we obtain:

(-5.18182×10^-9) * (((220.137+(((3(220.137)^2)/(32π^2))) (0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1]))))

Input interpretation:

$$-5.18182\times 10^{-9}\left(220.137+\frac{3\times 220.137^2}{32\,\pi^2}\left(0.57721566+\int_0^1 \log\left(\frac{105.7^2}{4\,\pi\times 0.51099895^2}+x\,(1-x)\times\frac{938.272^2}{4\,\pi\times 0.51099895^2}\right)x\,dx\right)\right)$$

log(x) is the natural logarithm

Result:

-0.0000152011

-0.0000152011

And inverting, changing the sign:

Input interpretation:

$$(-1)\Big/\left(-5.18182\times 10^{-9}\left(220.137+\frac{3\times 220.137^2}{32\,\pi^2}\left(0.57721566+\int_0^1 \log\left(\frac{105.7^2}{4\,\pi\times 0.51099895^2}+x\,(1-x)\times\frac{938.272^2}{4\,\pi\times 0.51099895^2}\right)x\,dx\right)\right)\right)$$

log(x) is the natural logarithm

Result:

65784.8

65784.8

Computation result:

$$(-1)\Big/\left(-5.18182\times 10^{-9}\left(220.137+\frac{1}{32\,\pi^2}(3\times 220.137^2)\left(0.57721566+\int_0^1 \log\left(\frac{105.7^2}{4\,\pi\,0.51099895^2}+\frac{x\,(1-x)\,938.272^2}{4\,\pi\,0.51099895^2}\right)x\,dx\right)\right)\right)=65\,784.8$$

We have also:

1/((((8 log^(29/3)(2) (log(3)/e)^(4/3))1/(3^7 3^(2/3)))))

Input:

$$\frac{1}{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)\times\frac{1}{3^7\times 3^{2/3}}}$$

log(x) is the natural logarithm

Exact result:

$$\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{8\log^{29/3}(2)}$$

Decimal approximation:

65785.000379988826425583043810490713858031675706144036138434035925
…

65785.00037998…

Alternative representations:

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}}=\frac{1}{\frac{8\log_e^{29/3}(2)\left(\frac{\log_e(3)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}}=\frac{1}{\frac{8\left(\log(a)\log_a(2)\right)^{29/3}\left(\frac{\log(a)\log_a(3)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}}=\frac{1}{\frac{8\left(2\coth^{-1}(3)\right)^{29/3}\left(\frac{2\coth^{-1}(2)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

Series representations:

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}}=\frac{2187\times 3^{2/3}\,e^{4/3}\left(-\frac{i}{2\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor-i\log(x)+i\sum_{k=1}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}}{k}}\right)^{4/3}}{8\left(2\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/3}}$$

$\text{for } x < 0$

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}}=$$

$$\frac{2187\times 3^{2/3}\,e^{4/3}\left(-\frac{i}{2\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-i\log(z_0)+i\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}}\right)^{4/3}}{8\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}}$$

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}} = \frac{2187\times 3^{2/3}\,e^{4/3}\left(\frac{1}{\left\lfloor\frac{\arg(3-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}}\right)^{4/3}}{8\left(\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}}$$

Integral representations:

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}} = \frac{2187\times 3^{2/3}\,e^{4/3}\left(\frac{1}{\int_1^3\frac{1}{t}\,dt}\right)^{4/3}}{8\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}}$$

$$\frac{1}{\frac{8\left(\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)}{3^7\times 3^{2/3}}} = -\frac{559872\,i\,3^{2/3}\,e^{4/3}\,\pi^{11}\sqrt[3]{-i\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\;\sqrt[3]{\frac{i}{\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}}{\left(\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\infty+\gamma}^{i\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}$$

for $-1 < \gamma < 0$

And again:

1/38(((1/((((8 log^(29/3)(2) (log(3)/e)^(4/3))1/(3^7 3^(2/3)))))))) – 2

Input:

$$\frac{1}{38}\times\frac{1}{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)\times\frac{1}{3^7\times 3^{2/3}}} - 2$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2$$

Decimal approximation:

1729.1842205260217480416590476444924699482019922669483194324746296

…

1729.18422052….≈ 1729 This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Alternate form:

$$\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}-608\log^{29/3}(2)}{304\log^{29/3}(2)}$$

Alternative representations:

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2=-2+\frac{1}{\frac{38\left(8\log_e^{29/3}(2)\left(\frac{\log_e(3)}{e}\right)^{4/3}\right)}{3^{2/3}\times 3^7}}$$

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2=-2+\frac{1}{\frac{38\left(8\left(\log(a)\log_a(2)\right)^{29/3}\left(\frac{\log(a)\log_a(3)}{e}\right)^{4/3}\right)}{3^{2/3}\times 3^7}}$$

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times3^{2/3}}}-2=-2+\frac{1}{\frac{38\left(8\left(2\coth^{-1}(3)\right)^{29/3}\left(\frac{2\coth^{-1}(2)}{e}\right)^{4/3}\right)}{3^{2/3}\times3^7}}$$

Series representations:

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times3^{2/3}}}-2=$$
$$\left(-608\left(2\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/3}+\right.$$
$$\left.2187\times3^{2/3}e^{4/3}\left(-\frac{i}{2\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor-i\log(x)+i\sum_{k=1}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}}{k}}\right)^{4/3}\right)\Bigg/$$
$$\left(304\left(2\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/3}\right)\quad\text{for } x<0$$

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times3^{2/3}}}-2=$$
$$\left(-608\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}+\right.$$
$$2187\times3^{2/3}e^{4/3}$$
$$\left.\left(-\frac{i}{2\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor-i\log(z_0)+i\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}}\right)^{4/3}\right)\Bigg/$$
$$\left(304\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}\right)$$

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2=$$

$$\Bigg(-608\left(\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}+2187\times 3^{2/3}e^{4/3}\left(1\Bigg/\left(\left\lfloor\frac{\arg(3-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}\right)\right)^{4/3}\Bigg)\Bigg/\left(304\left(\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}\right)$$

Integral representations:

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2=\frac{-608\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}+2187\times 3^{2/3}e^{4/3}\left(\frac{1}{\int_1^3\frac{1}{t}\,dt}\right)^{4/3}}{304\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}}$$

$$\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^{7}\times 3^{2/3}}}-2=$$

$$-\left(\left(\left(2\,i\left(139\,968\times 3^{2/3}\,e^{4/3}\,\pi^{11}\sqrt[3]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\right.\right.\right.\right.$$

$$\sqrt[3]{\frac{i}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}-$$

$$19\,i\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}$$

$$\left.\left.\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)\Big/$$

$$\left.\left(19\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^{2}\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)$$

$\text{for } -1<\gamma<0$

From which:

(((1/38(((1/((((8 log^(29/3)(2) (log(3)/e)^(4/3))1/(3^7 3^(2/3)))))))) - 2)))^1/15

Input:

$$\sqrt[15]{\frac{1}{38}\times\frac{1}{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)\times\frac{1}{3^{7}\times 3^{2/3}}}-2}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2}$$

Decimal approximation:

1.6438269044553051183625820311526069208942249153856205069885872087

…

$1.6438269\ldots \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934$

Alternate form:

$$\frac{1}{2^{4/15}\log^{29/45}(2)\sqrt[15]{\frac{19}{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}-608\log^{29/3}(2)}}}$$

All 15th roots of (2187 3^(2/3) (e/log(3))^(4/3))/(304 log^(29/3)(2)) - 2:

$$e^{0}\sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2} \approx 1.6438 \text{ (real, principal root)}$$

$$e^{(2i\pi)/15}\sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2} \approx 1.5017+0.6686\,i$$

$$e^{(4i\pi)/15}\sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2} \approx 1.0999+1.2216\,i$$

$$e^{(2i\pi)/5}\sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304\log^{29/3}(2)}-2} \approx 0.5080+1.5634\,i$$

$$e^{(8 i \pi)/15} \sqrt[15]{\frac{2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{304 \log^{29/3}(2)} - 2} \approx -0.17183 + 1.6348\, i$$

Alternative representations:

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}} - 2} = \sqrt[15]{-2+\frac{1}{\frac{38\left(8\log_e^{29/3}(2)\left(\frac{\log_e(3)}{e}\right)^{4/3}\right)}{3^{2/3}\times 3^7}}}$$

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}} - 2} = \sqrt[15]{-2+\frac{1}{\frac{38\left(8\left(\log(a)\log_a(2)\right)^{29/3}\left(\frac{\log(a)\log_a(3)}{e}\right)^{4/3}\right)}{3^{2/3}\times 3^7}}}$$

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}} - 2} = \sqrt[15]{-2+\frac{1}{\frac{38\left(8\left(2\coth^{-1}(3)\right)^{29/3}\left(\frac{2\coth^{-1}(2)}{e}\right)^{4/3}\right)}{3^{2/3}\times 3^7}}}$$

Series representations:

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}} - 2} =$$

$$\sqrt[15]{-2+\frac{2187\times 3^{2/3}\, e^{4/3}\left(\frac{1}{2 i \pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k (3-x)^k x^{-k}}{k}}\right)^{4/3}}{304\left(2 i \pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k (2-x)^k x^{-k}}{k}\right)^{29/3}}} \quad \text{for } x < 0$$

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2} =$$

$$\sqrt[15]{-2+\frac{2187\times 3^{2/3}\,e^{4/3}\left(\frac{1}{\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}}\right)^{4/3}}{304\left(\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\pi}\right\rfloor\left(\log\left(\frac{1}{z_0}\right)+\log(z_0)\right)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}}}$$

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2} =$$

$$\sqrt[15]{-2+\frac{2187\times 3^{2/3}\,e^{4/3}\left(\frac{1}{2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(3-z_0)^k z_0^{-k}}{k}}\right)^{4/3}}{304\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-z_0)^k z_0^{-k}}{k}\right)^{29/3}}}$$

Integral representations:

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2} = \frac{\sqrt[15]{\frac{2187\times 3^{2/3}\,e^{4/3}\sqrt[3]{\frac{1}{\int_1^3\frac{1}{t}\,dt}}-608\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}\int_1^3\frac{1}{t}\,dt}{\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}\int_1^3\frac{1}{t}\,dt}}}{2^{4/15}\sqrt[15]{19}}$$

$$\sqrt[15]{\frac{1}{\frac{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)38}{3^7\times 3^{2/3}}}-2} =$$

$$\sqrt[15]{\frac{2}{19}}\Bigg(\Bigg(\Bigg(-139968\,i\,3^{2/3}\,e^{4/3}\,\pi^{11}\sqrt[3]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}$$

$$\sqrt[3]{\frac{i}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}}-$$

$$19\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\Bigg)\Bigg/$$

$$\Bigg(\Bigg(\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\Bigg)\Bigg)\hat{}$$

$$(1/15)\quad\text{for } -1<\gamma<0$$

3*(((1/((((8 log^(29/3)(2) (log(3)/e)^(4/3))1/(3^7 3^(2/3)))))))-377-89-5

Input:

$$3\times\frac{1}{\left(8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)\times\frac{1}{3^7\times 3^{2/3}}}-377-89-5$$

log(*x*) is the natural logarithm

Exact result:

$$\frac{6561\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}{8\log^{29/3}(2)}-471$$

Decimal approximation:

196884.0011399664792767491314314721415740950271184321084153021077 7

…

196884.00113996….

196884/196883 is a fundamental number of the following *j*-invariant

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

(In mathematics, Felix Klein's *j*-invariant or *j* function, regarded as a function of a complex variable τ, is a modular function of weight zero for SL(2, Z) defined on the upper half plane of complex numbers. Several remarkable properties of *j* have to do with its *q* expansion (Fourier series expansion), written as a Laurent series in terms of $q = e^{2\pi i\tau}$ (the square of the nome), which begins:

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

Note that *j* has a simple pole at the cusp, so its *q*-expansion has no terms below q^{-1}.

All the Fourier coefficients are integers, which results in several almost integers, notably Ramanujan's constant:

$$e^{\pi\sqrt{163}} \approx 640320^3 + 744.$$

The asymptotic formula for the coefficient of q^n is given by

$$\frac{e^{4\pi\sqrt{n}}}{\sqrt{2}\,n^{3/4}},$$

as can be proved by the Hardy–Littlewood circle method)

Alternate form:

$$\frac{3\left(2187\times 3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3} - 1256\log^{29/3}(2)\right)}{8\log^{29/3}(2)}$$

Alternative representations:

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}} - 377 - 89 - 5 = -471 + \frac{3}{\frac{8\log_e^{29/3}(2)\left(\frac{\log_e(3)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}}-377-89-5=-471+\frac{3}{\frac{8\left(\log(a)\log_a(2)\right)^{29/3}\left(\frac{\log(a)\log_a(3)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}}-377-89-5=-471+\frac{3}{\frac{8\left(2\coth^{-1}(3)\right)^{29/3}\left(\frac{2\coth^{-1}(2)}{e}\right)^{4/3}}{3^{2/3}\times 3^7}}$$

Series representations:

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}}-377-89-5=$$

$$\left(3\left(-1256\left(2 i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/3}+2187\times 3^{2/3}\right.\right.$$
$$\left.\left.e^{4/3}\left(-\frac{i}{2\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor-i\log(x)+i\sum_{k=1}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}}{k}}\right)^{4/3}\right)\right)\Big/$$
$$\left(8\left(2 i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/3}\right)\quad\text{for } x<0$$

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}} - 377 - 89 - 5 =$$

$$\left(3\left(-1256\left(2\, i\, \pi \left\lfloor \frac{\pi - \arg\left(\frac{1}{z_0}\right) - \arg(z_0)}{2\pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\, (2-z_0)^k\, z_0^{-k}}{k}\right)^{29/3} + 2187\times 3^{2/3}\, e^{4/3} \left(-\frac{i}{2\pi \left\lfloor \frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\pi}\right\rfloor - i\log(z_0) + i \sum_{k=1}^{\infty} \frac{(-1)^k\, (3-z_0)^k\, z_0^{-k}}{k}}\right)^{4/3}\right)\right) \Big/ \left(8\left(2\, i\, \pi \left\lfloor \frac{\pi - \arg\left(\frac{1}{z_0}\right) - \arg(z_0)}{2\pi} \right\rfloor + \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\, (2-z_0)^k\, z_0^{-k}}{k}\right)^{29/3}\right)$$

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}} - 377 - 89 - 5 =$$

$$\left(3\left(-1256\left(\left\lfloor \frac{\arg(2-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(2-z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\, (2-z_0)^k\, z_0^{-k}}{k}\right)^{29/3} + 2187\times 3^{2/3}\, e^{4/3} \left(1 \Big/ \left(\left\lfloor \frac{\arg(3-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(3-z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\, (3-z_0)^k\, z_0^{-k}}{k}\right)\right)^{4/3}\right)\right) \Big/ \left(8\left(\left\lfloor \frac{\arg(2-z_0)}{2\pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(2-z_0)}{2\pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k\, (2-z_0)^k\, z_0^{-k}}{k}\right)^{29/3}\right)$$

Integral representations:

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}} - 377 - 89 - 5 =$$

$$\frac{3\left(-1256\left(\int_1^2 \frac{1}{t}\,dt\right)^{29/3} + 2187\times 3^{2/3}\,e^{4/3}\left(\frac{1}{\int_1^3 \frac{1}{t}\,dt}\right)^{4/3}\right)}{8\left(\int_1^2 \frac{1}{t}\,dt\right)^{29/3}}$$

$$\frac{3}{\frac{8\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^7\times 3^{2/3}}} - 377 - 89 - 5 =$$

$$-\left(\left(3\,i\left(559\,872\times 3^{2/3}\,e^{4/3}\,\pi^{11}\sqrt[3]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\,\sqrt[3]{\frac{i}{\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}} - 157\,i\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)\Big/\left(\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{10}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\right)$$

for $-1 < \gamma < 0$

65785 (8 log^(29/3)(2)) / (3^(2/3) (e/log(3))^(4/3)) + 2*48 + Pi

Input:

$$65\,785\times\frac{8\log^{29/3}(2)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}} + 2\times 48 + \pi$$

$\log(x)$ is the natural logarithm

Exact result:

$$96+\pi+\frac{526280\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^{2/3}}$$

Decimal approximation:

2286.1415800209902858659087891209407034910670974628108710542849850…

2286.14158002…. result very near to the charmed Lambda baryon mass 2286.46

Alternate forms:

$$\frac{1}{3}\left(288+3\pi+526280\sqrt[3]{3}\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}\right)$$

$$\frac{3^{2/3}(96+\pi)+526280\log^{29/3}(2)\left(\frac{\log(3)}{e}\right)^{4/3}}{3^{2/3}}$$

$$\pi+\frac{8\left(36e+65785\sqrt[3]{\frac{3}{e}}\log^{29/3}(2)\log^{4/3}(3)\right)}{3e}$$

Alternative representations:

$$\frac{65785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times48+\pi=96+\pi+\frac{526280\log_e^{29/3}(2)}{3^{2/3}\left(\frac{e}{\log_e(3)}\right)^{4/3}}$$

$$\frac{65785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times48+\pi=96+\pi+\frac{526280\left(\log(a)\log_a(2)\right)^{29/3}}{3^{2/3}\left(\frac{e}{\log(a)\log_a(3)}\right)^{4/3}}$$

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=96+\pi+\frac{526\,280\left(2\coth^{-1}(3)\right)^{29/3}}{3^{2/3}\left(\frac{e}{2\coth^{-1}(2)}\right)^{4/3}}$$

Series representations:

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=$$

$$\frac{1}{9\,e^{4/3}}\left(864\,e^{4/3}+9\,e^{4/3}\,\pi+4\,210\,240\,\sqrt[3]{6}\;e^{8/3\,i\,\pi\left\lfloor 1/2-\arg\left(\frac{1}{e}\right)/(2\,\pi)\right\rfloor}\right.$$

$$\left.\log^{29/3}(2)\sum_{k=0}^{\infty}2^k\binom{-\frac{4}{3}+k}{k}\sum_{j=0}^{k}-\frac{3\,(-1)^j\binom{k}{j}p_{j,k}}{-4+3\,j}\right)$$

$$\text{for}\left(c_k=\frac{(-1)^k}{e\,(1+k)}\text{ and }p_{j,0}=1\text{ and }p_{j,k}=\frac{e\sum_{m=1}^{k}(-k+m+j\,m)\,c_m\,p_{j,k-m}}{k}\right.$$

$$\left.\text{and }k\in\mathbb{Z}\text{ and }k>0\right)$$

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=\frac{1}{3\,e^{4/3}}\left(288\,e^{4/3}+3\,e^{4/3}\,\pi+\right.$$

$$526\,280\,\sqrt[3]{3}\left(2\,i\,\pi\left\lfloor\frac{\arg(2-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-x)^k\,x^{-k}}{k}\right)^{29/3}$$

$$\left.\left(2\,i\,\pi\left\lfloor\frac{\arg(3-x)}{2\,\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-x)^k\,x^{-k}}{k}\right)^{4/3}\right)\quad\text{for }x<0$$

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=\frac{1}{3\,e^{4/3}}\left(288\,e^{4/3}+3\,e^{4/3}\,\pi+526\,280\,\sqrt[3]{3}\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{29/3}\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}\right)^{4/3}\right)$$

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=\frac{1}{3\,e^{4/3}}\left(288\,e^{4/3}+3\,e^{4/3}\,\pi+526\,280\,\sqrt[3]{3}\left(\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{29/3}\left(\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}\right)^{4/3}\right)$$

Integral representations:

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=\frac{288\,e^{4/3}+3\,e^{4/3}\,\pi+526\,280\,\sqrt[3]{3}\left(\int_1^2\frac{1}{t}\,dt\right)^{29/3}\left(\int_1^3\frac{1}{t}\,dt\right)^{4/3}}{3\,e^{4/3}}$$

$$\frac{65\,785\left(8\log^{29/3}(2)\right)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}+2\times 48+\pi=\frac{1}{768\,e^{4/3}\,\pi^{11}}\left(73\,728\,e^{4/3}\,\pi^{11}+768\,e^{4/3}\,\pi^{12}-65\,785\sqrt[3]{3}\left(-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{2/3}\left(\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{9}\sqrt[3]{-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds}\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)\text{ for } -1<\gamma<0$$

[1/2((65785 (8 log^(29/3)(2)) / (3^(2/3) (e/log(3))^(4/3))))]^1/14

Input:

$$\sqrt[14]{\frac{1}{2}\left(65\,785\times\frac{8\log^{29/3}(2)}{3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}}\right)}$$

$\log(x)$ is the natural logarithm

Exact result:

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\,\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}$$

Decimal approximation:

1.6483843576513274004978071851735800261737631569286944849826048210...

$1.648384357\ldots \approx \zeta(2)=\frac{\pi^2}{6}=1.644934\ldots$

All 14th roots of (263140 log^(29/3)(2) (log(3)/e)^(4/3))/3^(2/3):

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\;e^{0}\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}\approx 1.6484\ \text{(real, principal root)}$$

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\;e^{(i\pi)/7}\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}\approx 1.4851+0.7152\,i$$

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\;e^{(2i\pi)/7}\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}\approx 1.0278+1.2888\,i$$

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\;e^{(3i\pi)/7}\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}\approx 0.3668+1.6071\,i$$

$$\frac{\sqrt[7]{2}\,\sqrt[14]{65\,785}\;e^{(4i\pi)/7}\log^{29/42}(2)\left(\frac{\log(3)}{e}\right)^{2/21}}{\sqrt[21]{3}}\approx -0.3668+1.6071\,i$$

Alternative representations:

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}}=\sqrt[14]{\frac{263\,140\log_{e}^{29/3}(2)}{3^{2/3}\left(\frac{e}{\log_{e}(3)}\right)^{4/3}}}$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \sqrt[14]{\frac{263\,140\left(\log(a)\log_a(2)\right)^{29/3}}{3^{2/3}\left(\frac{e}{\log(a)\log_a(3)}\right)^{4/3}}}$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \sqrt[14]{\frac{263\,140\left(2\coth^{-1}(3)\right)^{29/3}}{3^{2/3}\left(\frac{e}{2\coth^{-1}(2)}\right)^{4/3}}}$$

Series representations:

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \frac{1}{21\sqrt[21]{3}}\,2\times 2^{5/21}\sqrt[14]{65\,785}$$
$$e^{-\frac{2}{21}+\frac{4}{21}i\pi\left\lfloor\frac{1}{2}-\frac{\arg\left(\frac{1}{e}\right)}{2\pi}\right\rfloor}\log^{29/42}(2)\sum_{k=0}^{\infty}2^k\binom{-\frac{2}{21}+k}{k}\sum_{j=0}^{k}\frac{(-1)^j\binom{k}{j}p_{j,k}}{\frac{2}{21}-j}$$
$$\text{for}\left(c_k=\frac{(-1)^k}{e\,(1+k)}\text{ and }p_{j,0}=1\text{ and }\right.$$
$$\left.p_{j,k}=\frac{e\sum_{m=1}^{k}(-k+m+j\,m)\,c_m\,p_{j,k-m}}{k}\text{ and }k\in\mathbb{Z}\text{ and }k>0\right)$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \frac{1}{\sqrt[21]{3}\,e^{2/21}}\sqrt[7]{2}\sqrt[14]{65\,785}$$
$$\left(2i\pi\left\lfloor\frac{\arg(2-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(2-x)^k x^{-k}}{k}\right)^{29/42}$$
$$\left(2i\pi\left\lfloor\frac{\arg(3-x)}{2\pi}\right\rfloor+\log(x)-\sum_{k=1}^{\infty}\frac{(-1)^k(3-x)^k x^{-k}}{k}\right)^{2/21}\quad\text{for }x<0$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \frac{1}{\sqrt[21]{3}\ e^{2/21}}\ \sqrt[7]{2}\ \sqrt[14]{65\,785}$$
$$\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{29/42}$$
$$\left(2\,i\,\pi\left\lfloor\frac{\pi-\arg\left(\frac{1}{z_0}\right)-\arg(z_0)}{2\,\pi}\right\rfloor+\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}\right)^{2/21}$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \frac{1}{\sqrt[21]{3}\ e^{2/21}}$$
$$\sqrt[7]{2}\ \sqrt[14]{65\,785}\left(\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\right.$$
$$\left.\left\lfloor\frac{\arg(2-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\sum_{k=1}^{\infty}\frac{(-1)^k\,(2-z_0)^k\,z_0^{-k}}{k}\right)^{29/42}$$
$$\left(\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log\left(\frac{1}{z_0}\right)+\log(z_0)+\left\lfloor\frac{\arg(3-z_0)}{2\,\pi}\right\rfloor\log(z_0)-\right.$$
$$\left.\sum_{k=1}^{\infty}\frac{(-1)^k\,(3-z_0)^k\,z_0^{-k}}{k}\right)^{2/21}$$

Integral representations:

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} = \frac{\sqrt[7]{2}\ \sqrt[14]{65\,785}\ \left(\int_1^2\frac{1}{t}\,dt\right)^{29/42}\left(\int_1^3\frac{1}{t}\,dt\right)^{2/21}}{\sqrt[21]{3}\ e^{2/21}}$$

$$\sqrt[14]{\frac{65\,785\left(8\log^{29/3}(2)\right)}{\left(3^{2/3}\left(\frac{e}{\log(3)}\right)^{4/3}\right)2}} =$$
$$\frac{\sqrt[14]{65\,785}\ \left(-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{29/42}\left(-i\int_{-i\,\infty+\gamma}^{i\,\infty+\gamma}\frac{2^{-s}\,\Gamma(-s)^2\,\Gamma(1+s)}{\Gamma(1-s)}\,ds\right)^{2/21}}{2^{9/14}\ \sqrt[21]{3}\ e^{2/21}\ \pi^{11/14}}$$

for $-1<\gamma<0$

-1/[(-5.18182×10^-9) * (((220.137+(((3(220.137)^2)/(32π^2))) (0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1]))))]^1/23

Input interpretation:

$$-\left(1\Big/\left(\left(-5.18182\times 10^{-9}\left(220.137+\frac{3\times 220.137^2}{32\,\pi^2}\right)\left(0.57721566+\int_0^1\log\left(\frac{105.7^2}{4\,\pi\times 0.51099895^2}+x\,(1-x)\times\frac{938.272^2}{4\,\pi\times 0.51099895^2}\right)x\,dx\right)\right)\right)\hat{\ }(1/23)\right)$$

log(x) is the natural logarithm

Result:

$-1.6048 + 0.220574\,i$

Input interpretation:

$-1.6048 + 0.220574\,i$

i is the imaginary unit

Result:

$-1.6048\ldots +$
$0.220574\ldots\,i$

Polar coordinates:

$r = 1.61989$ (radius), $\theta = 3.005$ (angle)

1.61989 result that is a very good approximation to the value of the golden ratio 1.618033988749...

Polar forms:

$1.61989\,(\cos(3.005) + i\sin(3.005))$

$1.61989\,e^{3.005\,i}$

1/64(((-1/((((-5.18182×10^-9) * (((220.137+(((3(220.137)^2)/(32π^2))) (0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1])))))))-276+27)))

Input interpretation:

$$\frac{1}{64}\left((-1)\Big/\left(-5.18182\times 10^{-9}\left(220.137+\frac{3\times 220.137^2}{32\,\pi^2}\left(0.57721566+\int_0^1 \log\left(\frac{105.7^2}{4\,\pi\times 0.51099895^2}+x\,(1-x)\times\frac{938.272^2}{4\,\pi\times 0.51099895^2}\right)x\,dx\right)\right)\right)-276+27\right)$$

log(*x*) is the natural logarithm

Result:

1024.

1024 = 64 * 16

Computation result:

$$\frac{1}{64}\left((-1)\Big/\left(-5.18182\times 10^{-9}\left(220.137+\frac{1}{32\,\pi^2}\left(3\times 220.137^2\right)\left(0.57721566+\int_0^1 \log\left(\frac{105.7^2}{4\,\pi\,0.51099895^2}+\frac{x\,(1-x)\,938.272^2}{4\,\pi\,0.51099895^2}\right)x\,dx\right)\right)\right)-276+27\right)=1024.$$

1/8(((-1/((((-5.18182×10^-9) * (((220.137+(((3(220.137)^2)/(32π^2))) (0.57721566+integrate[ln(((105.7^2)/(4Pi*0.51099895^2)+x(1-x)*(938.272^2)/(4Pi*0.51099895^2)))]x,[0, 1])))))))-276+27)))

Input interpretation:

$$\frac{1}{8}\left((-1)\middle/\left(-5.18182\times 10^{-9}\left(220.137+\frac{3\times 220.137^2}{32\,\pi^2}\left(0.57721566+\int_0^1\log\left(\frac{105.7^2}{4\,\pi\times 0.51099895^2}+x\,(1-x)\times\frac{938.272^2}{4\,\pi\times 0.51099895^2}\right)x\,dx\right)\right)\right)-276+27\right)$$

log(x) is the natural logarithm

Result:

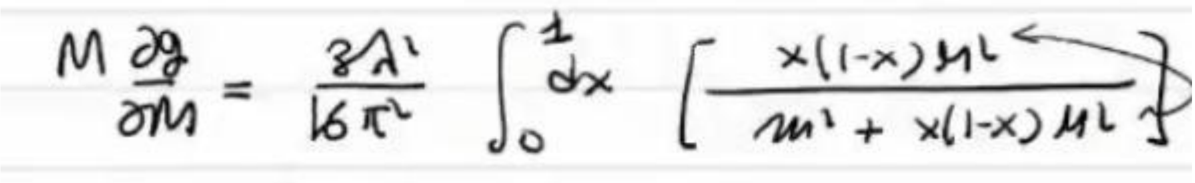
8191.98

8191.98 ≈ 8192

The total amplitude vanishes for gauge group SO(8192), while the vacuum energy is negative and independent of the gauge group.

The vacuum energy and dilaton tadpole to lowest non-trivial order for the open bosonic string. While the vacuum energy is non-zero and independent of the gauge group, the dilaton tadpole is zero for a unique choice of gauge group, SO(2^{13}) i.e. SO(8192). (From: “Dilaton Tadpole for the Open Bosonic String “ Michael R. Douglas and Benjamin Grinstein - September 2,1986)

From:



$$M\frac{\partial g}{\partial M} = \frac{3\lambda^2}{16\pi^2}\int_0^1 dx\left[\frac{x(1-x)M^2}{m^2+x(1-x)M^2}\right]$$

λ = -5.18182×10^-9 or 220.137 ; m = 0.51099895; M = 105.658

((((3(-5.18182×10^-9)^2)/(16Pi^2))))*(((integrate[x(1-x)*(105.7^2)/((((0.51099895^2)+x(1-x)*(105.658^2))))]x,[0, 1])))

Definite integral:

$$5.10113\times 10^{-19}\int_0^1 \frac{11\,172.5\,(1-x)\,x^2}{0.26112+11\,163.6\,(1-x)\,x}\,dx = 2.55132\times 10^{-19}$$

$2.55132*10^{-19}$

76/ ((-ln[((((3(-5.18182×10^-9)^2)/(16Pi^2))))*(((integrate[x(1-x)*(105.7^2)/((((0.51099895^2)+x(1-x)*(105.658^2))))]x,[0, 1])))]+4))

Input interpretation:

$$\frac{76}{-\log\left(\frac{3\left(-5.18182\times 10^{-9}\right)^2}{16\pi^2}\int_0^1\left(x\,(1-x)\times\frac{105.7^2}{0.51099895^2+x\,(1-x)\times 105.658^2}\right)x\,dx\right)+4}$$

log(x) is the natural logarithm

Result:

1.6235

1.6235 result that is a very good approximation to the value of the golden ratio 1.618033988749...

((√(10-2√5) -2))/((√5-1))* -log((3 (-5.18182×10^(-9))^2)/(16π^2) integral_0^1 ((x (1 - x) 105.7^2) x)/(0.51099895^2 + x (1-x) 105.658^2)dx)

Input interpretation:

$$\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\times(-1)\;\log\left(\frac{3\left(-5.18182\times 10^{-9}\right)^2}{16\pi^2}\int_0^1\frac{\left(x\,(1-x)\times 105.7^2\right)x}{0.51099895^2+x\,(1-x)\times 105.658^2}\,dx\right)$$

log(x) is the natural logarithm

Result:

12.1621

12.1621 result very near to the entropy black hole ln(196883) = 12.1904

Computation result:

$$\frac{\left(\sqrt{10-2\sqrt{5}}-2\right)(-1)\log\left(\frac{\left(3\left(-5.18182\times10^{-9}\right)^2\right)\int_0^1 \frac{\left(x(1-x)105.7^2\right)x}{0.51099895^2+x(1-x)105.658^2}\,dx}{16\pi^2}\right)}{\sqrt{5}-1} =$$

$$12.1621$$

exp[((√(10-2√5) -2))⁄((√5-1))* -log((3 (-5.18182×10^(-9))^2)/(16π^2) integral_0^1 ((x (1 - x) 105.7^2) x)/(0.51099895^2 + x (1-x) 105.658^2)dx)]+64(64+16+4+2)-24

Input interpretation:

$$\exp\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\times(-1)\log\left(\frac{3\left(-5.18182\times10^{-9}\right)^2}{16\pi^2}\int_0^1 \frac{\left(x(1-x)\times105.7^2\right)x}{0.51099895^2+x(1-x)\times105.658^2}\,dx\right)\right)+64(64+16+4+2)-24$$

log(x) is the natural logarithm

Result:

196883.

196883

196884/196883 is a fundamental number of the following *j*-invariant

$$j(\tau)=q^{-1}+744+196884q+21493760q^2+864299970q^3+20245856256q^4+\cdots$$

(In mathematics, Felix Klein's *j*-invariant or *j* function, regarded as a function of a complex variable τ, is a modular function of weight zero for SL(2, Z) defined on the upper half plane of complex numbers. Several remarkable properties of *j* have to do with its q expansion (Fourier series expansion), written as a Laurent series in terms of $q = e^{2\pi i\tau}$ (the square of the nome), which begins:

$$j(\tau) = q^{-1} + 744 + 196884q + 21493760q^2 + 864299970q^3 + 20245856256q^4 + \cdots$$

Note that j has a simple pole at the cusp, so its q-expansion has no terms below q^{-1}.

All the Fourier coefficients are integers, which results in several almost integers, notably Ramanujan's constant:

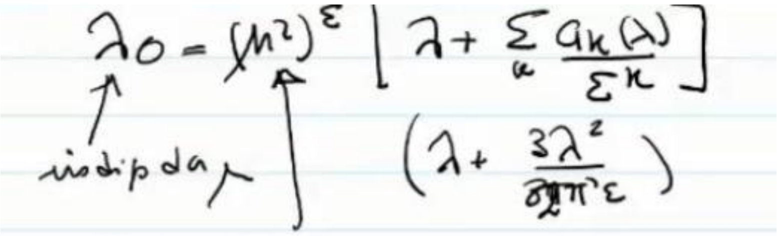
$$e^{\pi\sqrt{163}} \approx 640320^3 + 744.$$

The asymptotic formula for the coefficient of q^n is given by

$$\frac{e^{4\pi\sqrt{n}}}{\sqrt{2}\,n^{3/4}},$$

as can be proved by the Hardy–Littlewood circle method)

We consider



$$\lambda_0 = (\mu^2)^{\varepsilon}\left[\lambda + \sum_{k} \frac{a_k(\lambda)}{\varepsilon^k}\right]$$

$$\left(\lambda + \frac{3\lambda^2}{32\pi^2\varepsilon}\right)$$

For:

λ = -5.18182×10^-9 or 220.137 ; m = 0.51099895; M = 105.658

μ = 0.51099895

(0.51099895^2)^x (((-5.18182×10^-9 + ((3* (-5.18182×10^-9)^2)/(32Pi^2*x)))))

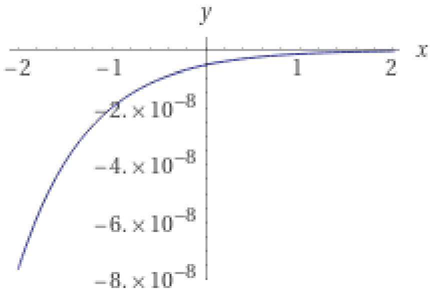
Input interpretation:

$$(0.51099895^2)^x \left(-5.18182\times 10^{-9} + \frac{3\left(-5.18182\times 10^{-9}\right)^2}{32\pi^2 x}\right)$$

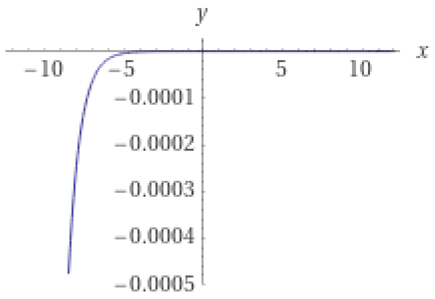
Result:

$$0.26112^x \left(\frac{2.55056\times 10^{-19}}{x} - 5.18182\times 10^{-9}\right)$$

Plots:



(x from −2 to 2)



(x from −12 to 12)

Alternate forms:

$$-\frac{5.18182\times 10^{-9}\times 0.26112^x \left(x - 4.92214\times 10^{-11}\right)}{x}$$

$$-\frac{0.26112^x \left(5.18182\times 10^{-9}\, x - 2.55056\times 10^{-19}\right)}{x}$$

Expanded form:

$$\frac{2.55056\times 10^{-19}\times 0.26112^{x}}{x}-5.18182\times 10^{-9}\times 0.26112^{x}$$

Alternate form assuming x>0:

$$\frac{0.26112^{x}\left(2.55056\times 10^{-19}-5.18182\times 10^{-9}\,x\right)}{x}$$

Root:

$$x\approx 4.92214\times 10^{-11}$$

Property as a real function:
Domain

$$\{x\in\mathbb{R}:x\neq 0\}$$

$\mathbb{R}$ is the set of real numbers

Series expansion at x = 0:

$$\frac{2.55056\times 10^{-19}}{x}-5.18182\times 10^{-9}+6.95802\times 10^{-9}\,x-4.67153\times 10^{-9}\,x^{2}+2.09094\times 10^{-9}\,x^{3}+O\left(x^{4}\right)$$

(Laurent series)

Series expansion at x = ∞:

$$e^{-1.34278\,x}\left(-5.18182\times 10^{-9}+\frac{2.55056\times 10^{-19}}{x}+O\left(\left(\frac{1}{x}\right)^{6}\right)\right)$$

Derivative:

$$\frac{d}{dx}\left(0.26112^{x}\left(\frac{2.55056\times 10^{-19}}{x}-5.18182\times 10^{-9}\right)\right)=\frac{0.26112^{x}\left(6.95802\times 10^{-9}\,x^{2}-3.42483\times 10^{-19}\,x-2.55056\times 10^{-19}\right)}{x^{2}}$$

Indefinite integral:

$$\int \left(0.51099895^2\right)^x \left(-5.18182\times 10^{-9} + \frac{3\left(-5.18182\times 10^{-9}\right)^2}{32\,\pi^2\,x}\right) dx =$$

$$2.55056\times 10^{-19}\,\mathrm{Ei}(-1.34278\,x) + 3.85904\times 10^{-9}\times 0.26112^x + \text{constant}$$

$\mathrm{Ei}(x)$ is the exponential integral Ei

Local maximum:

$$\max\left\{0.26112^x \left(\frac{2.55056\times 10^{-19}}{x} - 5.18182\times 10^{-9}\right)\right\} = 0 \text{ at } x \approx -6.05443\times 10^{-6}$$

Local minimum:

$$\min\left\{0.26112^x \left(\frac{2.55056\times 10^{-19}}{x} - 5.18182\times 10^{-9}\right)\right\} = 0 \text{ at } x \approx 6.05448\times 10^{-6}$$

Limit:

$$\lim_{x\to\infty} 0.26112^x \left(-5.18182\times 10^{-9} + \frac{2.55056\times 10^{-19}}{x}\right) = 0 \approx 0$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(0.26112^x \left(-5.18182\times 10^{-9} + \frac{2.55056\times 10^{-19}}{x}\right) - e^{-1.34278\,x} \left(-5.18182\times 10^{-9} + \frac{2.55056\times 10^{-19}}{x}\right)\right) dx = 0$$

(0.51099895^2)^(4.92214×10^-11)(((-5.18182×10^-9 + ((3* (-5.18182×10^-9)^2)/(32Pi^2*(4.92214×10^-11))))))

Input interpretation:

$$(0.51099895^2)^{4.92214\times 10^{-11}}\left(-5.18182\times 10^{-9}+\frac{3\,(-5.18182\times 10^{-9})^2}{32\,\pi^2\times 4.92214\times 10^{-11}}\right)$$

Result:

$-1.29139\ldots\times 10^{-15}$

$-1.29139\ldots{*}10^{-15}$

From which:

57*1/ln[(0.51099895^2)^(4.92214×10^-11)(((-5.18182×10^-9 + ((3* (-5.18182×10^-9)^2)/(32Pi^2*(4.92214×10^-11))))))]

Input interpretation:

$$57\times\frac{1}{\log\left((0.51099895^2)^{4.92214\times 10^{-11}}\left(-5.18182\times 10^{-9}+\frac{3\,(-5.18182\times 10^{-9})^2}{32\,\pi^2\times 4.92214\times 10^{-11}}\right)\right)}$$

$\log(x)$ is the natural logarithm

Result:

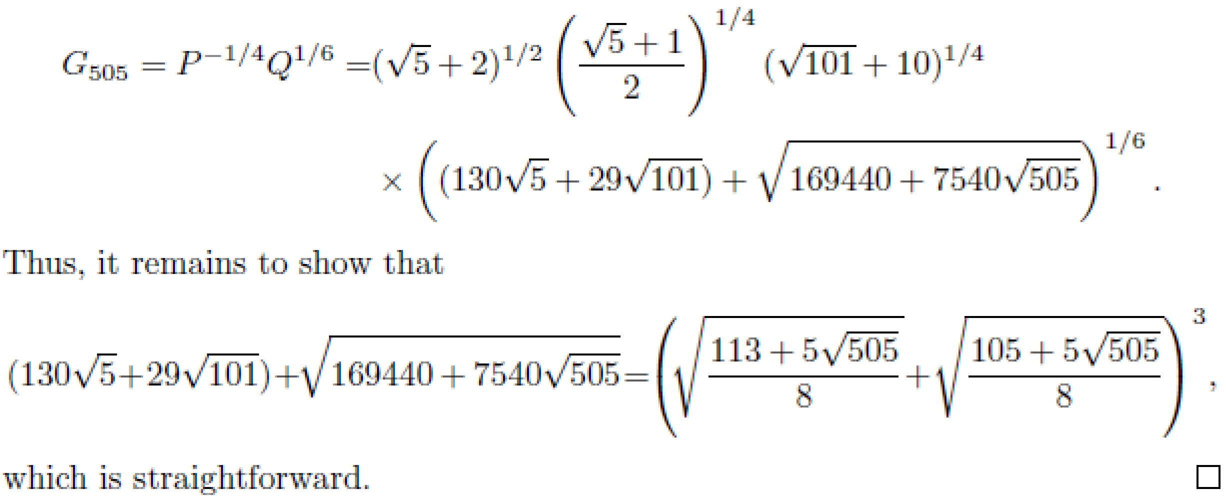
$-1.6487834634680424261651340519070552364067833450300752216434211\ldots-0.1510893821929692018584359979862008380447852115083675506685025 1\ldots\,i$

Polar coordinates:

$r=1.65569$ (radius), $\theta=-3.05021$ (angle)

1.65569 result that is very near to the 14th root of the following Ramanujan's class invariant $Q=(G_{505}/G_{101/5})^3$ = 1164.2696 i.e. 1.65578...

Indeed, from:



$$G_{505} = P^{-1/4}Q^{1/6} = (\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$
$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

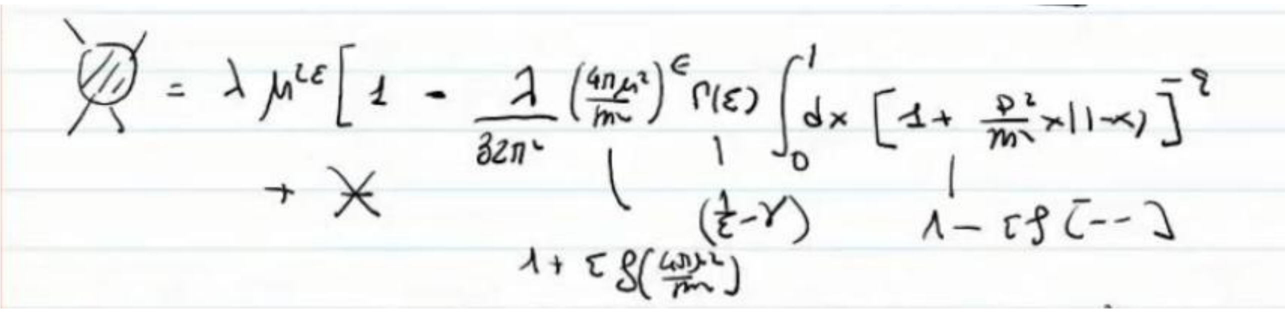
Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}=\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^{3},$$

which is straightforward. □

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^{3}} = 1{,}65578\ldots$$

From:



$$= \lambda\mu^{2\epsilon}\left[1 - \frac{\lambda}{32\pi^2}\left(\frac{4\pi\mu^2}{m^2}\right)^{\epsilon}\Gamma(\epsilon)\int_0^1 dx\left[1+\frac{p^2}{m^2}x(1-x)\right]^{-\epsilon} + \times\right.$$

$$\left(\frac{1}{\epsilon}-\gamma\right) \qquad 1-\epsilon\,\ell[--]$$

$$1+\epsilon\,\ell\left(\frac{4\pi\mu^2}{m^2}\right)$$

For:

1+ε ln(4Pi*μ^2)/(m^2)   1/ε – γ   1-ε ln(((1+M^2/m^2 * x(1-x)))

and

$\varepsilon = 4.92214*10^{-11}$ λ = -5.18182×10^-9 or 220.137 ; m = 80.379;

M = 125.1   μ = 0.51099895

-5.18182×10^-9*0.51099895^(2*4.92214e-11) [1-(-5.18182×10^-9)/(32Pi^2)* 1+(4.92214e-11) ln((4Pi*0.51099895^2)/(80.379^2))*(1/(4.92214e-11)-0.57721566)

1+(5.18182×10^-9)/(32Pi^2)* 1+(4.92214e-11) ln((4Pi*0.51099895^2)/(80.379^2))*(1/(4.92214e-11)-0.57721566)

Input interpretation:

$$1+\frac{5.18182\times 10^{-9}}{32\,\pi^2}\times 1+ 4.92214\times 10^{-11}\log\left(\frac{4\,\pi\times 0.51099895^2}{80.379^2}\right)\left(\frac{1}{4.92214\times 10^{-11}}-0.57721566\right)$$

log(x) is the natural logarithm

Result:

−6.58526…

-6.58526…

integrate[((1-4.92214e-11))*ln(((1+125.1^2/80.379^2(x (1 - x)))))^-2]dx, [0, 1]

Input interpretation:

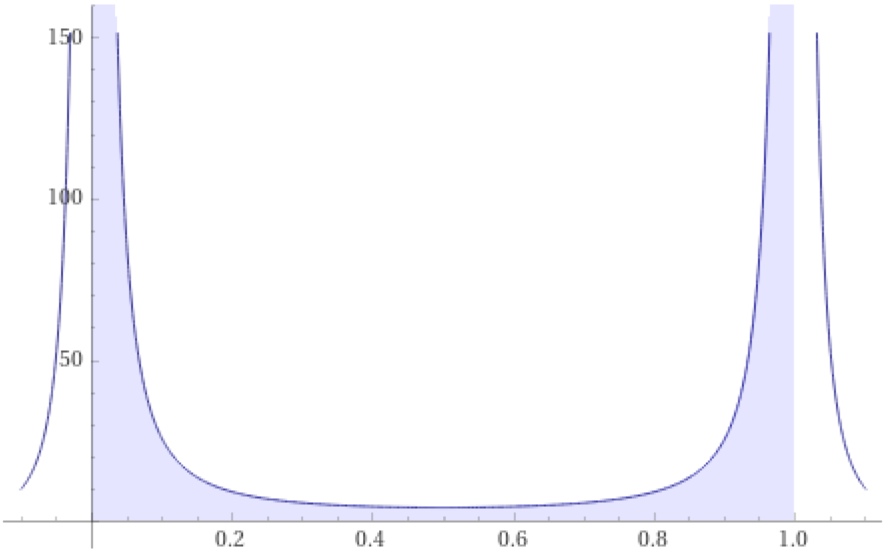
$$\int_0^1 \frac{1-4.92214\times 10^{-11}}{\log^2\left(1+\frac{125.1^2\,(x\,(1-x))}{80.379^2}\right)}\,dx$$

log(x) is the natural logarithm

Result:

(integral does not converge)

Visual representation of the integral:



Nonintegrable singularities of the integrand in the integration interval:

x	nonintegrable expansion terms of the integrand
0	$\frac{0.170428}{x^2}+\frac{0.753686}{x}$
1	$\frac{0.170428}{(x-1)^2}-\frac{0.753686}{x-1}$

(((-5.18182×10^-9*0.51099895^(2*4.92214e-11)))) (-6.58526)* (0.170428/(-1 + x)^2 - 0.753686/(-1 + x))

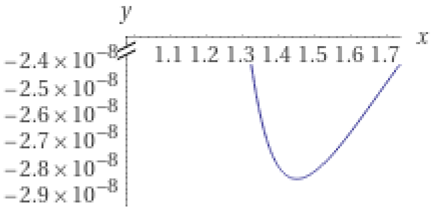
Input interpretation:

$$\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times(-6.58526)\left(\frac{0.170428}{(-1+x)^2}-\frac{0.753686}{-1+x}\right)$$

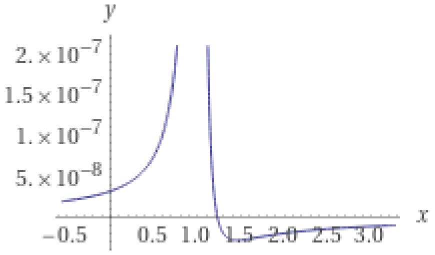
Result:

$$3.41236\times 10^{-8}\left(\frac{0.170428}{(x-1)^2}-\frac{0.753686}{x-1}\right)$$

Plots:



(x from 1 to 1.7)



(x from −0.5 to 3.3)

Alternate forms:

$$-\frac{2.57185\times 10^{-8}\,(x-1.22613)}{(x-1)^2}$$

$$\frac{3.15341\times 10^{-8}-2.57185\times 10^{-8}\,x}{(x-1)^2}$$

$$-\frac{3.41236\times 10^{-8}\,(0.753686\,x-0.924114)}{(x-1)^2}$$

Partial fraction expansion:

$$\frac{5.81562\times 10^{-9}}{(x-1)^2}-\frac{2.57185\times 10^{-8}}{x-1}$$

Expanded forms:

$$\frac{5.81562\times 10^{-9}}{x^2-2x+1}-\frac{2.57185\times 10^{-8}}{x-1}$$

$$\frac{3.15341\times 10^{-8}-2.57185\times 10^{-8}\,x}{x^2-2x+1}$$

$$\frac{5.81562\times 10^{-9}}{(x-1)^2}-\frac{2.57185\times 10^{-8}}{x-1}$$

Root:

$x \approx 1.22613$

Properties as a real function:

Domain

$\{x\in\mathbb{R} : x\neq 1\}$

Range

$$\left\{y\in\mathbb{R} : y \geq -\frac{96\,918\,380\,844\,126\,802\,517\,739\,557}{3\,408\,560\,000\,000\,000\,000\,000\,000\,000\,000\,000}\right\}$$

$\mathbb{R}$ is the set of real numbers

Series expansion at x = 0:

$$3.15341\times 10^{-8}+3.73497\times 10^{-8}\,x+4.31654\times 10^{-8}\,x^2+4.8981\times 10^{-8}\,x^3+5.47966\times 10^{-8}\,x^4+O\left(x^5\right)$$

(Taylor series)

Series expansion at x = ∞:

$$-\frac{2.57185\times10^{-8}}{x}-\frac{1.99029\times10^{-8}}{x^2}-\frac{1.40873\times10^{-8}}{x^3}-\frac{8.27164\times10^{-9}}{x^4}+O\left(\left(\frac{1}{x}\right)^5\right)$$

(Laurent series)

Derivative:

$$\frac{d}{dx}\left(3.41236\times10^{-8}\left(\frac{0.170428}{(x-1)^2}-\frac{0.753686}{x-1}\right)\right)=\frac{2.57185\times10^{-8}\,x-3.73497\times10^{-8}}{(x-1)^3}$$

Indefinite integral:

$$\int\left(-5.18182\times10^{-9}\,0.51099895^{2\,4.92214\times10^{-11}}\right)(-6.58526)\left(\frac{0.170428}{(-1+x)^2}-\frac{0.753686}{-1+x}\right)dx=$$
$$-\frac{5.81562\times10^{-9}}{x-1}-2.57185\times10^{-8}\log(1-x)+\text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

Global minimum:

$$\min\left\{3.41236\times10^{-8}\left(\frac{0.170428}{(x-1)^2}-\frac{0.753686}{x-1}\right)\right\}=-\frac{3\,624\,537\,734\,422\,427}{127\,472\,768\,657\,913\,236\,000\,000}$$
$$\text{at }x=\frac{547\,271}{376\,843}$$

Limit:

$$\lim_{x\to\pm\infty}3.41236\times10^{-8}\left(\frac{0.170428}{(-1+x)^2}-\frac{0.753686}{-1+x}\right)=0\approx0$$

Thence

$$\left(-5.18182\times10^{-9}\times0.51099895^{2\times4.92214\times10^{-11}}\right)\times(-6.58526)\left(\frac{0.170428}{(-1+x)^2}-\frac{0.753686}{-1+x}\right)$$

we obtain:

(((-5.18182×10^-9*0.51099895^(2*4.92214e-11)))) (-6.58526)* (0.170428/(-1 + 1.22613)^2 - 0.753686/(-1 + 1.22613))

Input interpretation:

$$\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times (-6.58526)\left(\frac{0.170428}{(-1+1.22613)^2}-\frac{0.753686}{-1+1.22613}\right)$$

Result:

$$-2.01211\ldots\times 10^{-12}$$

$-2.01211\ldots*10^{-12}$

64*ln[(((-5.18182×10^-9*0.51099895^(2*4.92214e-11)))) (-6.58526)* (0.170428/(-1 + 1.22613)^2 - 0.753686/(-1 + 1.22613))]+7

Input interpretation:

$$64\log\left(\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times (-6.58526)\left(\frac{0.170428}{(-1+1.22613)^2}-\frac{0.753686}{-1+1.22613}\right)\right)+7$$

log(x) is the natural logarithm

Result:

$$-1716.637520216868627247699650363864840806883179198521717743080\ldots + 201.0619298297467672616091765298881845886188415600067725423964\ldots i$$

Polar coordinates:

$r = 1728.37$ (radius), $\theta = 3.025$ (angle)

1728.37

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

Polar forms:

$$1728.37 (\cos(3.025) + i \sin(3.025))$$

$$1728.37 e^{3.025 i}$$

(((64*ln[(((-5.18182×10^-9*0.51099895^(2*4.92214e-11)))) (-6.58526)*(0.170428/(-1 + 1.22613)^2 - 0.753686/(-1 + 1.22613))]+7)))^1/15

Input interpretation:

$$\left(64 \log\left(\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times (-6.58526)\left(\frac{0.170428}{(-1+1.22613)^2}-\frac{0.753686}{-1+1.22613}\right)\right)+7\right)\text{\^{}}(1/15)$$

$\log(x)$ is the natural logarithm

Result:

1.6104628752517684022218227893726382387443211222782424017811566 1…
+
0.32925215688229203766596215638267026746699058089823159201812300 9…
i

Polar coordinates:

$r = 1.64378$ (radius), $\theta = 0.201667$ (angle)

$1.64378 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

From

$$\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times (-6.58526)\left(\frac{0.170428}{(-1+1.22613)^2}-\frac{0.753686}{-1+1.22613}\right)$$

we obtain:

48/((ln[(((√(10-2√5) -2))/((√5-1)))*1/[(((-5.18182×10^-9*0.51099895^(2*4.92214e-11)))) (-6.58526)* (0.170428/(-1 + 1.22613)^2 - 0.753686/(-1 + 1.22613))]]+Pi))

Input interpretation:

$$48\left/\left(\log\left(\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\times 1\left/\left(\left(-5.18182\times 10^{-9}\times 0.51099895^{2\times 4.92214\times 10^{-11}}\right)\times (-6.58526)\left(\frac{0.170428}{(-1+1.22613)^2}-\frac{0.753686}{-1+1.22613}\right)\right)\right.\right)+\pi\right)\right.$$

log(x) is the natural logarithm

Result:

1.646234877934848597847921014479296513605958960508359423091 79694…
−
0.179483347329600530631507946618397122269122069697716634527441769…
i

Polar coordinates:

$r = 1.65599$ (radius), $\theta = -0.108598$ (angle)

1.65599 result that is very near to the 14th root of the following Ramanujan's class invariant $Q = (G_{505}/G_{101/5})^3 = 1164.2696$ i.e. 1.65578...

Indeed, from:

$$G_{505} = P^{-1/4}Q^{1/6} = (\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$
$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

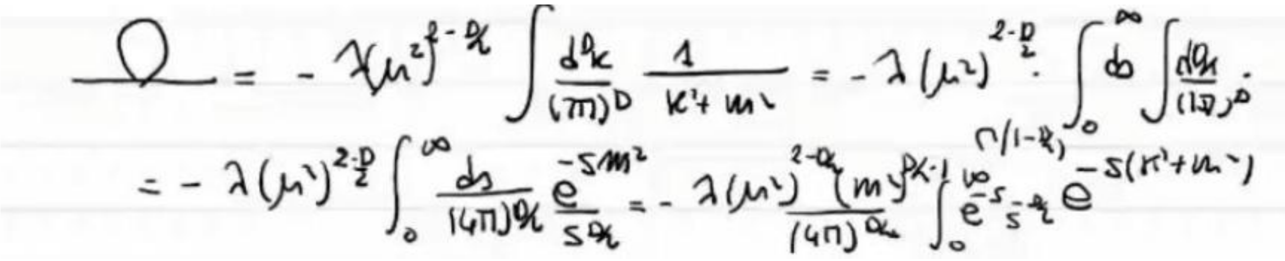
Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}} = \left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

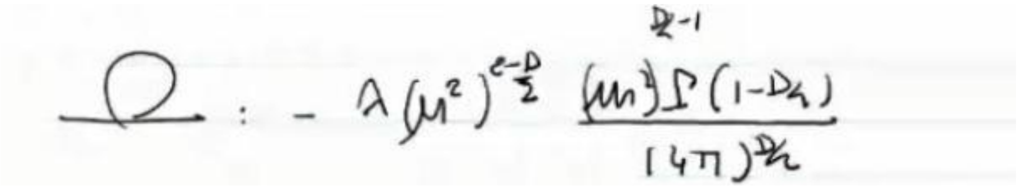
which is straightforward. ☐

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3} = 1{,}65578\ldots$$

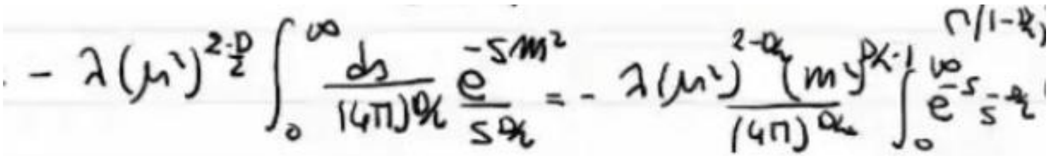
Now, we have that:



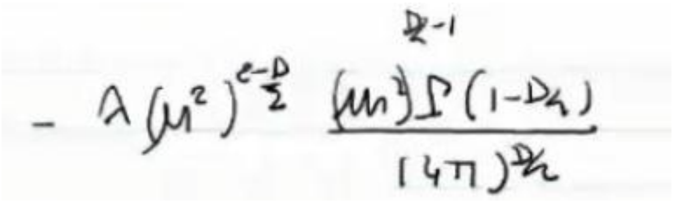
$$= -\lambda(\mu^2)^{2-D/2}\int\frac{d^Dk}{(2\pi)^D}\frac{1}{k^2+m^2} = -\lambda(\mu^2)^{\frac{2-D}{2}}\int_0^\infty ds\int\frac{d^Dk}{(2\pi)^D}e^{-s(k^2+m^2)}$$
$$= -\lambda(\mu^2)^{\frac{2-D}{2}}\int_0^\infty\frac{ds}{(4\pi)^{D/2}}\frac{e^{-sm^2}}{s^{D/2}} = -\lambda(\mu^2)^{\frac{2-D}{2}}\frac{(m^2)^{D/2-1}}{(4\pi)^{D/2}}\overbrace{\int_0^\infty e^{-s}s^{-D/2}}^{\Gamma(1-D/2)}$$



$$: -\lambda(\mu^2)^{\frac{2-D}{2}}\frac{(m^2)^{D/2-1}\Gamma(1-D/2)}{(4\pi)^{D/2}}$$



$$-\lambda(\mu^2)^{\frac{2-D}{2}}\int_0^\infty\frac{ds}{(4\pi)^{D/2}}\frac{e^{-sm^2}}{s^{D/2}} = -\lambda(\mu^2)^{\frac{2-D}{2}}\frac{(m^2)^{D/2-1}}{(4\pi)^{D/2}}\overbrace{\int_0^\infty e^{-s}s^{-D/2}}^{\Gamma(1-D/2)}$$



$$-\lambda(\mu^2)^{2-\frac{D}{2}}\frac{(m^2)^{\frac{D}{2}-1}\Gamma(1-D/2)}{(4\pi)^{D/2}}$$

We have:

$$-\lambda(\mu^2)^{2-D/2}\ \frac{(m^2)^{\frac{D}{2}-1}\Gamma(1-D/2)}{(4\pi)^{D/2}}$$

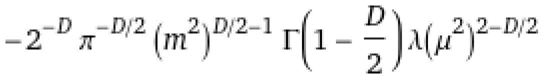
Input:

$$-\lambda(\mu^2)^{2-D/2}\times\frac{(m^2)^{D/2-1}\,\Gamma\left(1-\frac{D}{2}\right)}{(4\,\pi)^{D/2}}$$

$\lambda(n)$ gives the Liouville function

$\Gamma(x)$ is the gamma function

Exact result:

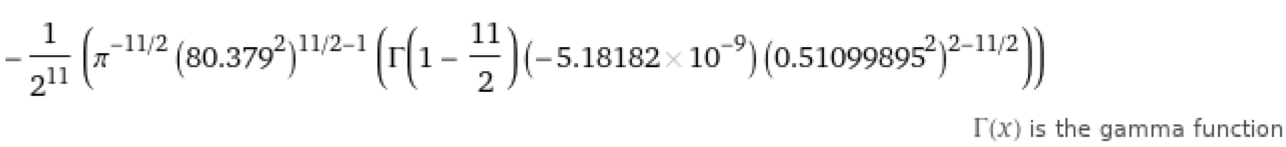


$$-2^{-D}\,\pi^{-D/2}\,(m^2)^{D/2-1}\,\Gamma\left(1-\frac{D}{2}\right)\lambda(\mu^2)^{2-D/2}$$

λ = -5.18182×10^-9 or 220.137 ; m = 80.379; μ = 0.51099895

-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2))))]

Input interpretation:



$$-\frac{1}{2^{11}}\left(\pi^{-11/2}\,(80.379^2)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)(-5.18182\times10^{-9})\,(0.51099895^2)^{2-11/2}\right)\right)$$

$\Gamma(x)$ is the gamma function

Result:

-4309.87…

-4309.87…

From which:

-(-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2))))]-64+2*0.956866373)

Input interpretation:

$$-\left(-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times 10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)-64+2\times 0.956866373\right)$$

$\Gamma(x)$ is the gamma function

Result:

4371.96…

4371.96….≈ 4372

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}}-24+276e^{-\pi\sqrt{22}}-\cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}}+\cdots, \end{aligned}$$

so that

$$64(g_{22}^{24}+g_{22}^{-24})=e^{\pi\sqrt{22}}-24+4372e^{-\pi\sqrt{22}}+\cdots=64\{(1+\sqrt{2})^{12}+(1-\sqrt{2})^{12}\}.$$

Exp(Pi*sqrt22)-24+4372*exp(-Pi*sqrt22)

Input:

$\exp(\pi\sqrt{22})-24+4372\exp(-\pi\sqrt{22})$

Exact result:

$-24+4372\, e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}$

Decimal approximation:

$2.5089279999999847086673765157648456304393912762332204498628 5\ldots\times 10^6$

2508927.9999 ≈ 2508928

Property:

$-24+4372\, e^{-\sqrt{22}\,\pi}+e^{\sqrt{22}\,\pi}$ is a transcendental number

Alternate form:

$$e^{-\sqrt{22}\,\pi}\left(4372-24\,e^{\sqrt{22}\,\pi}+e^{2\sqrt{22}\,\pi}\right)$$

Series representations:

$$\exp\left(\pi\sqrt{22}\right)-24+4372\exp\left(-\pi\sqrt{22}\right)=$$
$$-24+4372\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{\frac{1}{2}}{k}\right)+\exp\left(\pi\sqrt{21}\sum_{k=0}^{\infty}21^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\exp\left(\pi\sqrt{22}\right)-24+4372\exp\left(-\pi\sqrt{22}\right)=$$
$$-24+4372\exp\left(-\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)+\exp\left(\pi\sqrt{21}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{21}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\exp\left(\pi\sqrt{22}\right)-24+4372\exp\left(-\pi\sqrt{22}\right)=$$
$$-24+4372\exp\left(-\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k\,z_0^{-k}}{k!}\right)+$$
$$\exp\left(\pi\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k(22-z_0)^k\,z_0^{-k}}{k!}\right)\quad\text{for (not }(z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$$

64[(1+sqrt2)^12+(1-sqrt2)^12]

Input:

$$64\left(\left(1+\sqrt{2}\right)^{12}+\left(1-\sqrt{2}\right)^{12}\right)$$

Result:

2 508 928

2508928

-[1/(2^7)] * [π^(-7/2) (80.379^2)^(7/2 - 1) (((gamma(1 - 7/2) (-5.18182e-9)(0.51099895^2)^(2 - 7/2))))]

Input interpretation:

$$-\frac{1}{2^7}\left(\pi^{-7/2}\left(80.379^2\right)^{7/2-1}\left(\Gamma\left(1-\frac{7}{2}\right)\left(-5.18182\times10^{-9}\right)\left(0.51099895^2\right)^{2-7/2}\right)\right)$$

Γ(x) is the gamma function

Result:

−0.0175095…

-0.0175095….

2(((1/64*(((64^3-(-4309.87338 / (((-[1/(2^7)] * [π^(-7/2) (80.379^2)^(7/2 - 1) (((gamma(1 - 7/2) (-5.18182e-9)(0.511^2)^(2 - 7/2))))])))))))-(1+0.979))))

Input interpretation:

$$2\left(\frac{1}{64}\left(64^3-\frac{-4309.87338}{-\frac{1}{2^7}\left(\pi^{-7/2}\left(80.379^2\right)^{7/2-1}\left(\Gamma\left(1-\frac{7}{2}\right)\left(-5.18182\times10^{-9}\right)\left(0.511^2\right)^{2-7/2}\right)\right)}\right)-(1+0.979)\right)$$

Γ(x) is the gamma function

Result:

495.980…

495.980….≈ 496

The number 496 is a very important number in superstring theory. The dimension of the gauge group of type I string theory must be 496. The group is therefore SO(32). From this discovery started the first superstring revolution. It was realized in 1985 that the heterotic string can admit another possible gauge group, namely E_8 x E_8.

From

$$-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times 10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)$$

we obtain, considering κ = (((√(10-2√5) -2))/((√5-1))):

-(((√(10-2√5) -2))/((√5-1)))*((-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2)))))]))+8-1/Pi

Input interpretation:

$$-\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\left(-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times 10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)\right)+8-\frac{1}{\pi}$$

$\Gamma(x)$ is the gamma function

Result:

1232.03…

1232.03… result practically equal to the Delta baryon mass 1232

From which:

(((-(((√(10-2√5) -2))/((√5-1)))*((-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2)))))]))+8-1/Pi - 64)))^1/14

Input interpretation:

$$\left(-\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\left(-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)\right)+8-\frac{1}{\pi}-64\right)\hat{}\,(1/14)$$

$\Gamma(x)$ is the gamma function

Result:

1.6561656063113879839580942113309555209098180195529043546735570190...

1.656165606…. result that is very near to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^3=1164.2696$ i.e. 1.65578...

Indeed, from:

$$G_{505}=P^{-1/4}Q^{1/6}=(\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$

$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}=\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. ☐

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3}=1{,}65578\ldots$$

And:

(((-(((√(10-2√5) -2))/((√5-1)))*((-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2))))]))+8-1/Pi+128)))^1/15

Input interpretation:

$$\left(-\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\left(-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times 10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)\right)+8-\frac{1}{\pi}+128\right){}^\wedge(1/15)$$

Γ(x) is the gamma function

Result:

1.6177192594623428469354957850596186969762625109672388896797302172…

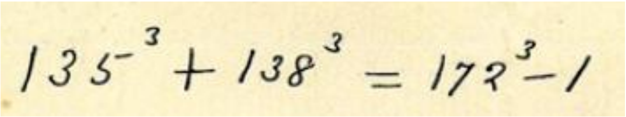
1.617719259…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

And again:

(((-(((√(10-2√5) -2))/((√5-1)))*((-[1/(2^11)] * [π^(-11/2) (80.379^2)^(11/2 - 1) (((gamma(1 - 11/2) (-5.18182e-9)(0.51099895^2)^(2 - 11/2))))]))+8-1/Pi+((172^3-1-138^3)^1/3))))^1/15

where

$\left(\sqrt[3]{172^3-1-138^3}\right)$ = 135 that we obtain from the following Ramanujan taxicab expression:



$135^3 + 138^3 = 172^3 - 1$

Input interpretation:

$$\left(-\frac{\sqrt{10-2\sqrt{5}}-2}{\sqrt{5}-1}\left(-\frac{1}{2^{11}}\left(\pi^{-11/2}\left(80.379^2\right)^{11/2-1}\right.\right.\right.$$
$$\left.\left.\left.\left(\Gamma\left(1-\frac{11}{2}\right)\left(-5.18182\times 10^{-9}\right)\left(0.51099895^2\right)^{2-11/2}\right)\right)\right)+\right.$$
$$\left.8-\frac{1}{\pi}+\sqrt[3]{172^3-1-138^3}\right)\text{^}(1/15)$$

$\Gamma(x)$ is the gamma function

Result:

1.6182730195622209139396406084680753255644466686704352533584189226

…

1.618273…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Mathematical connections with some sectors of String Theory

From:

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:

Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

From:

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\, e^{\gamma_E\, \phi} = -\, \frac{\beta_E^{(p)}\, h^2}{\gamma_E}\, e^{-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

$$16\, k'\, e^{-\,2\,C} = \frac{h^2\left(p\,+\,1\,-\,\frac{2\,\beta_E^{(p)}}{\gamma_E}\right) e^{-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}}{(7\,-\,p)}$$

$$(A')^2 = k\, e^{-\,2\,A} + \frac{h^2}{16(p\,+\,1)}\left(7\,-\,p\,+\,\frac{2\,\beta_E^{(p)}}{\gamma_E}\right) e^{-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\, e^{-\pi\sqrt{18}}$ instead of

$$e^{-\,2\,(8\,-\,p)\,C\,+\,2\,\beta_E^{(p)}\,\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of *e* (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096 e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 642, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18)) we obtain:

Input:

$$\exp\left(-\pi \sqrt{18}\right)$$

Exact result:

$$e^{-3\sqrt{2}\,\pi}$$

Decimal approximation:

$$1.6272016226072509292942156739117979541838581136954016\ldots \times 10^{-6}$$

1.6272016… * 10^{-6}

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$e^{-\pi\sqrt{18}}$ = 1.6272016… * 10^-6 from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10\text{^}{-6}$$

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^}{-6}$$

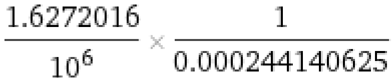
Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

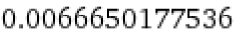
(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:



$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:



0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625} e^{-6C+\phi} = \frac{1}{0.000244140625} e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi \sqrt{18}\right) \times \frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi \sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\pi \sqrt{17} \sum_{k=0}^{\infty} 17^{-k} \binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi \sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\pi \sqrt{17} \sum_{k=0}^{\infty} \frac{\left(-\frac{1}{17}\right)^k \left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi \sqrt{18}\right)}{0.000244141} = 4096 \exp\left(-\frac{\pi \sum_{j=0}^{\infty} \operatorname{Res}_{s=-\frac{1}{2}+j} 17^{-s} \Gamma\left(-\frac{1}{2} - s\right) \Gamma(s)}{2 \sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi} = 0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625} =$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$= 0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757\ldots$

-5.010882647757…

Alternative representations:

$$\log(0.006665017846190000) = \log_e(0.006665017846190000)$$

$$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$$

$$\log(0.006665017846190000) = -\text{Li}_1(0.993334982153810000)$$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k (-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2 i \pi \left\lfloor \frac{\arg(0.006665017846190000 - x)}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t} \, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757 \ldots$$

and for C = 1, we obtain:

$\phi = -5.010882647757 + 6 = \mathbf{0.989117352243} = \boldsymbol{\phi}$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.987428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\dots}}}}\approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\dfrac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

The mean between the two results of the above Rogers-Ramanujan continued fractions is 0.97798855285, value very near to the ψ Regge slope 0.979:

Ψ	3	$m_c = 1500$	0.979	-0.09

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value $\mathbf{0.989117352243} = \boldsymbol{\phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}}\approx 0.9991104684$$

From

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

We have:

$$\begin{aligned} e^{2C} &= \frac{2\,\xi\,e^{\frac{\phi}{2}}}{1\,\pm\,\sqrt{1\,-\,\frac{\xi T}{3}\,e^{2\phi}}} \\ \frac{h^2}{32} &= \frac{\xi^7\,e^{4\phi}}{\left(1\,\pm\,\sqrt{1\,-\,\frac{\xi T}{3}\,e^{2\phi}}\right)^7}\left[\frac{42}{\xi}\left(1\,\pm\,\sqrt{1\,-\,\frac{\xi\,T}{3}\,e^{2\phi}}\right)\,+\,5\,T\,e^{2\phi}\right]\,. \end{aligned} \tag{2.7}$$

For

$T = \frac{16}{\pi^2}$

$\xi = 1$

we obtain:

(2*e^(0.989117352243/2)) / (1+sqrt(((1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))

Input interpretation:

$$\frac{2\,e^{0.989117352243/2}}{1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}}$$

Result:

$0.83941881822\ldots -$
$1.4311851867\ldots\, i$

Polar coordinates:

$r = 1.65919106525$ (radius), $\theta = -59.607521917°$ (angle)

1.65919106525….. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Series representations:

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{2\, e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\, e^{2\times 0.98911735224300000}}{3\,\pi^2}}} =$$

$$\frac{2\, e^{0.49455867612150000}}{1+\sqrt{z_0}\, \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(1-\frac{16\, e^{1.97823470448600000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}}$$

for $(\text{not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

From

$$\frac{h^2}{32} = \frac{\xi^7\, e^{4\phi}}{\left(1 \pm \sqrt{1 - \frac{\xi T}{3}\, e^{2\phi}}\right)^7} \left[\frac{42}{\xi}\left(1 \pm \sqrt{1 - \frac{\xi T}{3}\, e^{2\phi}}\right) + 5\, T\, e^{2\phi}\right]$$

We obtain:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\, e^{2\times 0.989117352243}}\right)^7} \left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\, e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\, e^{2\times 0.989117352243}\right)$$

Result:

$50.84107889\ldots -$
$20.34506335\ldots\, i$

Polar coordinates:

$r = 54.76072411$ (radius), $\theta = -21.80979492°$ (angle)

54.76072411…..

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Bigg/\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7=$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Bigg/\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right) e^{4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7 =$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Bigg/$$

$$\left(\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From which:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]*1/34

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)\times\frac{1}{34}$$

Result:

1.495325850… −
0.5983842161… i

Polar coordinates:

$r = 1.610609533$ (radius), $\theta = -21.80979492°$ (angle)

1.610609533…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\left(17\,\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

Now, we have:

$$e^{2C} = \frac{2\,\xi\,e^{-\frac{\phi}{2}}}{1+\sqrt{1+\frac{\xi\Lambda}{3}\,e^{2\phi}}}\,, \qquad (2.9)$$

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right)-13\,\Lambda\,e^{2\phi}\right]. \qquad (2.10)$$

For:

$\xi = 1$

$\Lambda \simeq \frac{4\pi^2}{25}$

$\phi = 0.989117352243$

From

$$e^{2C} = \frac{2\xi e^{-\frac{\phi}{2}}}{1 + \sqrt{1 + \frac{\xi\Lambda}{3} e^{2\phi}}},$$

we obtain:

((2*e^(-0.989117352243/2))) /
((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))

Input interpretation:

$$\frac{2 e^{-0.989117352243/2}}{1 + \sqrt{1 + \frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right) e^{2\times 0.989117352243}}}$$

Result:

0.382082347529...

0.382082347529….

Series representations:

$$\frac{2 e^{-0.98911735224300000/2}}{1 + \sqrt{1 + \frac{\left(4\pi^2\right) e^{2\times 0.98911735224300000}}{3\times 25}}} = 2 \Big/ \left(e^{0.4945586761215000} \left(1 + \sqrt{\frac{4 e^{1.978234704486000}\pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)\right)$$

$$\frac{2 e^{-0.98911735224300000/2}}{1 + \sqrt{1 + \frac{\left(4\pi^2\right) e^{2\times 0.98911735224300000}}{3\times 25}}} = 2 \Big/ \left(e^{0.4945586761215000} \left(1 + \sqrt{\frac{4 e^{1.978234704486000}\pi^2}{75}} \sum_{k=0}^{\infty} \frac{\left(-\frac{75}{4}\right)^k \left(e^{1.978234704486000}\pi^2\right)^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$\frac{2\,e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}} = \frac{2}{e^{0.4945586761215000}\left(1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)}$$

$$\text{for (not } (z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \leq 0))$$

From which:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))))))))

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\,(4\pi^2)\right)e^{2\times 0.989117352243}}}}$$

Result:

1.65430921270...

1.6543092….. We note that, the result 1.6543092... is very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Indeed:

$$G_{505}=P^{-1/4}Q^{1/6}=(\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$
$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}=\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. ☐

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3}=1{,}65578\ldots$$

Series representations:

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}=$$
$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}=$$
$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224330000/2}\right)}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times0.98911735224430000}}{3\times25}}}} = 1+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

for (not $(z_0\in\mathbb{R}$ and $-\infty<z_0\le 0))$

And from

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right]^7}\left[42\left(1+\sqrt{1+\frac{\Lambda}{3}\,e^{2\phi}}\right)-13\,\Lambda\,e^{2\phi}\right].$$

we obtain:

e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))-13*(4Pi^2)/25*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{-4\times0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times0.989117352243}\right)\right)$$

Result:

$-0.034547055658\ldots$

-0.034547055658…

Series representations:

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Bigg/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times0.9891173522430000}\right)\right)e^{-4\times0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times0.9891173522430000}\right)\right)e^{-4\times0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times0.9891173522430000}}{3\times25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

$\text{for }(\text{not }(z_0\in\mathbb{R}\text{ and }-\infty<z_0\leq 0))$

From which:

47 *1/(((-1/((((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))))))

Input interpretation:

$$47\left(-\left(1\Big/1\Big/\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right.\right.\right.\right.\right. -$$
$$\left.\left.\left.\left.\left. 13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)\right)$$

Result:

1.6237116159...

1.6237116159…. result that is an approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$-\left(47\Big/1\Big/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right.\right.\right.\right. -$$
$$\left.\left.\left.\left.\frac{1}{25}\left(4\pi^2\right)13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/$$
$$\left.\left(1+\sqrt{1+\frac{\left(4\pi^2\right)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right) =$$
$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2\right.\right. -$$
$$25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$
$$\left.\left.\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\,e^{5.934704113458000}\right.$$
$$\left.\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$-\left(47\Big/1\Big/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$

$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$-\left(47\Big/1\Big/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$

$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not $(z_0\in\mathbb{R}$ and $-\infty<z_0\le 0)$)

And again:

32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))

Input interpretation:

$$32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)$$

Result:

−1.1055057810...

-1.1055057810….

We note that the result -1.1055057810…. is very near to the value of Cosmological Constant, less 10^{-52} , thence 1.1056, with minus sign

Series representations:

$$\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 =$$

$$-\left(\left(1344\left(-25\, e^{1.978234704486000}+52\, e^{3.956469408972000}\,\pi^2-25\, e^{1.978234704486000}\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\, e^{5.934704113458000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(32\, e^{-4\times 0.9891173522430000} \left(42 \left(1 + \sqrt{1 + \frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}\, (4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\right) \Big/ \left(1 + \sqrt{1 + \frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 = -\left(\left(1344 \left(-25\, e^{1.978234704486000} + 52\, e^{3.956469408972000}\, \pi^2 - 25\, e^{1.978234704486000} \sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \frac{\left(-\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)\right) \Big/ \left(25\, e^{5.934704113458000} \left(1 + \sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \frac{\left(-\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(32\, e^{-4\times 0.9891173522430000} \left(42 \left(1 + \sqrt{1 + \frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}\, (4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\right) \Big/ \left(1 + \sqrt{1 + \frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 = -\left(\left(1344 \left(-25\, e^{1.978234704486000} + 52\, e^{3.956469408972000}\, \pi^2 - 25\, e^{1.978234704486000} \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(1 + \frac{4\, e^{1.978234704486000}\, \pi^2}{75} - z_0\right)^k z_0^{-k}}{k!}\right)\right) \Big/ \left(25\, e^{5.934704113458000} \left(1 + \sqrt{z_0} \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{1}{2}\right)_k \left(1 + \frac{4\, e^{1.978234704486000}\, \pi^2}{75} - z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

And:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))))]^5

Input interpretation:

$$-\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)^5$$

Result:

1.651220569...

1.651220569…. result very near to the 14th root of the following Ramanujan’s class invariant $Q = \left(G_{505}/G_{101/5}\right)^3$ = 1164.2696 i.e. 1.65578...

Series representations:

$$-\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000}\,\pi^2-25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^5\right)\Big/\left(9\,765\,625\,e^{19.78234704486000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^{35}\right)$$

$$-\left(\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000}\,\pi^2-25\,\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^5\right)\Big/$$

$$\left(9\,765\,625\,e^{19.78234704486000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{35}\right)$$

$$-\left(\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5=$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\,e^{1.978234704486000}\,\pi^2-25\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^5\right)\Big/$$

$$\left(9\,765\,625\,e^{19.78234704486000}\left(1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^{35}\right)$$

for (not ($z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0$))

We obtain also:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))))]^1/2

Input interpretation:

$$-\sqrt{\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}}\right)^{7}}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^{2}\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)}$$

Result:

-0
$1.0514303501\ldots\, i$

Polar coordinates:

$r = 1.05143035007$ (radius), $\theta = -90°$ (angle)

1.05143035007

Series representations:

$$-\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}$$

$$\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)}$$

for (not $(z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0)$)

1 / -[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))- 13*(4Pi^2)/25*e^(2*0.989117352243))]))))]^1/2

Input interpretation:

$$-\left(1\middle/\sqrt{32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)}\right)$$

Result:

0.95108534763... i

Polar coordinates:

$r = 0.95108534763$ (radius), $\theta = 90°$ (angle)

0.95108534763

We know that the primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index $n_s = 0.965 \pm 0.004$, consistent with the predictions of slow-roll, single-field, inflation.

Thence 0.95108534763 is a result very near to the spectral index n_s, to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\dots}}}}\approx 0.9568666373$$

Series representations:

$$-\left(1\middle/\left(\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\middle/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}\right)\right)=$$

$$-\left(5\middle/\left(8\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\middle/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}\right)\right)$$

$$-\Bigg(1\Big/\Bigg(\sqrt{\Bigg(\Bigg(32\,e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\;-$$

$$\frac{1}{25}\,(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)\Bigg)\Bigg)\Bigg)=$$

$$-\Bigg(5\Big/\Bigg(8\sqrt{21}\;\sqrt{\Bigg(\Bigg(\Bigg(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$

$$\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)\Big/$$

$$\Bigg(e^{3.956469408972000}\Bigg(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}$$

$$\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)^7\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)}$$

$$\begin{aligned}&-\Bigg(1\Bigg/\Bigg(\sqrt{\Bigg(\Bigg(32\, e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}}\\
&\qquad (4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg/\\
&\qquad \Bigg(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)\Bigg)\Bigg) =\\
&-\Bigg(5\Bigg/\Bigg(8\sqrt{21}\,\sqrt{\Bigg(\Bigg(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}}\\
&\qquad \sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)\Bigg/\\
&\qquad \Bigg(e^{3.956469408972000}\\
&\qquad \Bigg(1+\sqrt{z_0}\sum_{k=0}^{\infty}\\
&\qquad \frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)^7\Bigg)\Bigg)\Bigg)\Bigg)\end{aligned}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From the previous expression

$$\frac{\dfrac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}}{\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)\right)}$$

= -0.034547055658…

we have also:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))))) + (-0.034547055658)

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times0.989117352243}}}}-0.034547055658$$

Result:

1.61976215705...

1.61976215705….. result that is a very good approximation to the value of the golden ratio 1.618033988749...

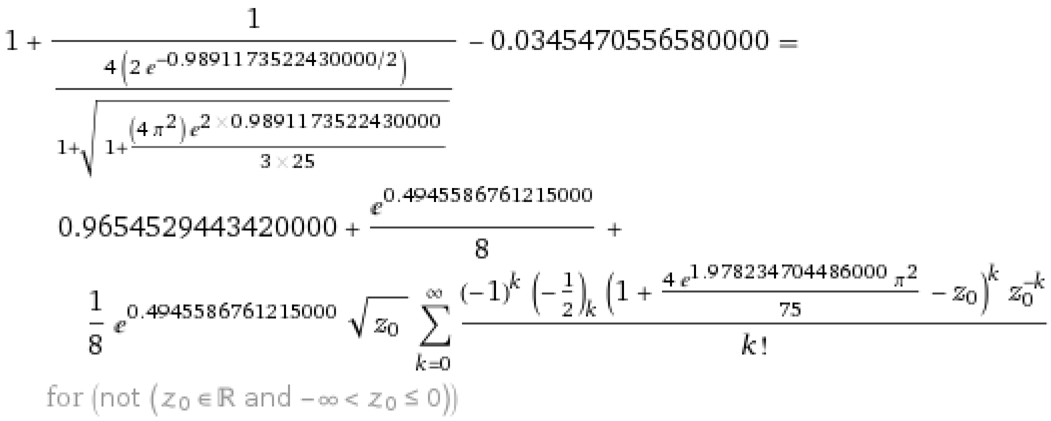
Series representations:

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224430000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.98911735224430000}}{3\times25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224430000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times0.98911735224430000}}{3\times25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$



$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

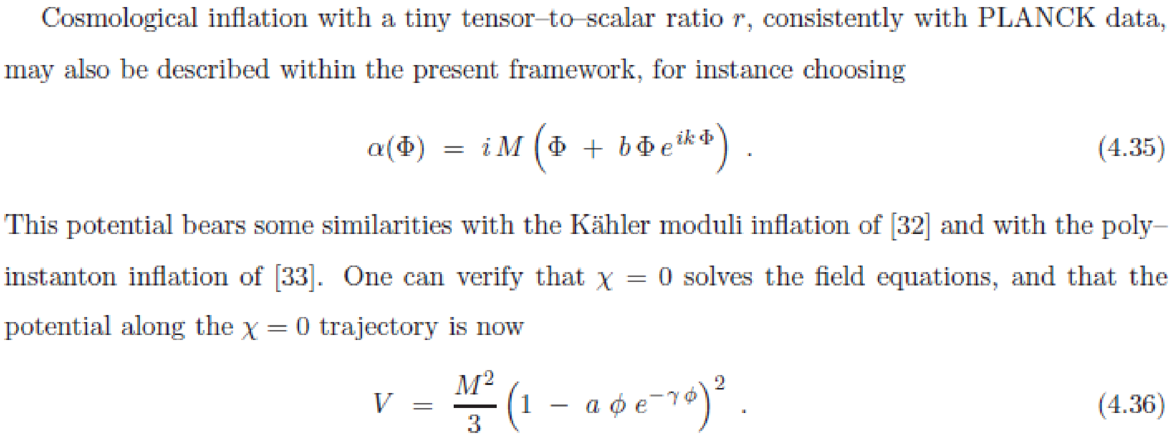
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From

Properties of Nilpotent Supergravity

E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:



Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{ik\,\Phi}\right)\;. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2\;. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2 \,.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\;,$$

$$a \;=\; \frac{b\,\gamma}{e} \;<\; 0\;, \qquad \gamma \;=\; \frac{k}{\sqrt{6}} \;<\; 0\,.$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\dfrac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V = \frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V = \frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\,M^2 \pm 6.58545\times 10^{-10}\,\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

$$V = 0.00221324\left(b^2\,M^2 + 24.5445\,b\,M^2 + 150.609\,M^2\right)$$

$$-0.00221324\,b^2\,M^2 - 0.054323\,b\,M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\,M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\,b^2\,M^2 + 0.054323\,b\,M^2 + 0.333333\,M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right) = 0.054323\,(0.0814845\,b + 1)\,M^2$$

Implicit derivatives:

$$\frac{\partial b(M, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M, V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b, V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b, M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b, M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b+1)^2\,M^2\right\}=0 \text{ at } (b,\,M)=(-16,\,0)$$

Global minima:

$$\min\left\{\frac{1}{3}\,M^2\left(1-\frac{(b\;2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

$$\text{for } b=-\frac{226\,802\,245}{18\,480\,874}$$

$$\min\left\{\frac{1}{3}\,M^2\left(1-\frac{(b\;2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

$$\text{for } M=0$$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

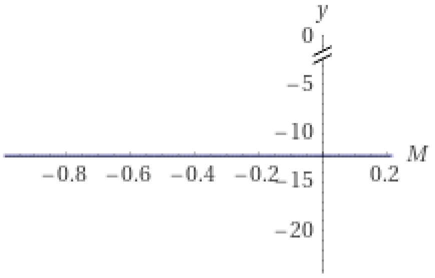
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

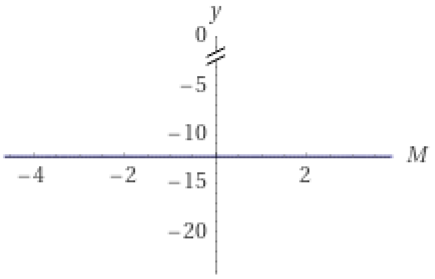
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4} - 0.054323\,M^2\right)}{M^2}$$

Plots:



(M from -1 to 0.2)



(M from -4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2 - 1.21228\times 10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times 10^{-7}\sqrt{M^4} - 12.2723\,M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M^2} - 12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M^2} - 12.2723\right) + O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

-12.2723

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times 10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$
$$\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$
$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{at}\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4}\right)}{M^2} - -12.2723 \right) dM = 0$$

From b that is equal to

$$\frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4}\right)}{M^2}$$

from:

$$V = \frac{1}{3} (0.0814845\, b + 1)^2 M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

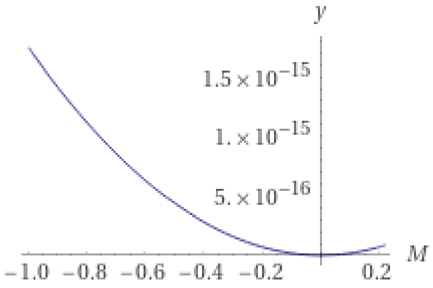
Input interpretation:

$$\frac{1}{3} \left(0.0814845 \times \frac{225.913 \left(-0.054323\, M^2 + 6.58545 \times 10^{-10} \sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

$$0$$

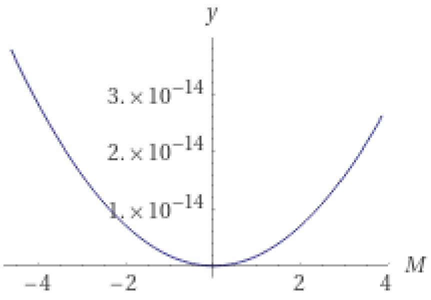
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(M from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$$O\left(M^{62194}\right)$$

(Taylor series)

Series expansion at M = ∞:

$$1.75541\times 10^{-15}\, M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{1}{3}\, M^2\left(1+\frac{18.4084\left(-0.054323\, M^2+6.58545\times 10^{-10}\,\sqrt{M^4}\right)}{M^2}\right)^2 - 1.75541\times 10^{-15}\, M^2\right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\, M^2+6.58545\times 10^{-10}\,\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2+6.58545\times10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2}+1\right)^2$$
$$\left(-0.5^2\right)$$

Result:

$-4.38851344494746454534897078337808802083333333333333333333\ldots\times 10^{-16}$

-4.38851344947*10^{-16}

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.0216215191594327255835325340494083333333333333333333333333\ldots \times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323 \times 3^2 + 6.58545 \times 10^{-10}\sqrt{3^4}\right)}{3^2} + 1\right)^2 \times 3^2$$

Result:

$1.579864841810872363256294820161116875 \times 10^{-14}$

1.57986484181*10^{-14}

For M = 2:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$$7.021621519159432725583532534049408333333333333333333333333\ldots\times 10^{-15}$$

$7.021621519*10^{-15}$

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)}$$

Result:

$5.9776991059\ldots \times 10^{-8}$

5.9776991059*10^{-8} result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}}\, l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}}\, l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([((((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left(\left(1/\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)\wedge(1/7)-\frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

$\log(x)$ is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_P = \sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_P = \frac{F_P}{q_P} = \sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck's Electric flux

$$\phi_P^E = \mathbf{E}_P l_P^2 = \phi_P l_P = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

5.975498*10^{-8} V*m Lorentz-Heaviside value

Planck's Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

1.042940*10^{27} V Lorentz-Heaviside value

Relationship between Planck's Electric Flux and Planck's Electric Potential

$E_P * l_P$ $= (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

$1\,042\,939\,771\,935\,000\,000\,000\,000\,000$

Scientific notation:

$1.042939771935 \times 10^{27}$

$1.042939771935*10^{27} \approx 1.042940*10^{27}$

Or:

$E_P * l_P^2 / l_P$ $= (5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:

$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:

$1.04293988541707573556041347592929544155441816222254220500133\ldots \times 10^{27}$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

Observations

We note that, from the number 8, we obtain as follows:

8^2

64

$8^2 \times 2 \times 8$

1024

$8^4 = 8^2 \times 2^6$

True

$8^4 = 4096$

$8^2 \times 2^6 = 4096$

$2^{13} = 2 \times 8^4$

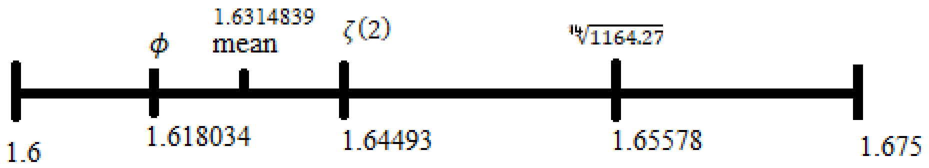
True

$2^{13} = 8192$

$2 \times 8^4 = 8192$

We notice how from the numbers 8 and 2 we get 64, 1024, 4096 and 8192, and that 8 is the fundamental number. In fact $8^2 = 64$, $8^3 = 512$, $8^4 = 4096$. We define it "fundamental number", since 8 is a Fibonacci number, which by rule, divided by the previous one, which is 5, gives 1.6 , a value that tends to the golden ratio, as for all numbers in the Fibonacci sequence

“Golden” Range



Finally we note how $8^2 = 64$, multiplied by 27, to which we add 1, is equal to 1729, the so-called "Hardy-Ramanujan number". Then taking the 15th root of 1729, we obtain a value close to $\zeta(2)$ that 1.6438 ..., which, in turn, is included in the range of what we call "golden numbers"

Furthermore for all the results very near to 1728 or 1729, adding $64 = 8^2$, one obtain values about equal to 1792 or 1793. These are values almost equal to the Planck multipole spectrum frequency 1792.35 and to the hypothetical Gluino mass

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability

References

Complex Analysis in Number Theory – 22.11.1994 - *Anatoly A. Karatsuba*

On the Zeros of the Davenport Heilbronn Function
S. A. Gritsenko - Received May 15, 2016 - ISSN 0081-5438, Proceedings of the Steklov Institute of Mathematics, 2017, Vol. 296, pp. 65–87.

Course of Field Theory and Gravity - *Prof. Augusto Sagnotti* (SNS Pisa-Italy)

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

Properties of Nilpotent Supergravity
E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015